

DESCRIPTION

Title of Invention

DETERGENT COMPOSITION

5

Technical Field

[0001]

The present invention relates to a detergent composition.

Priority is claimed on Japanese Patent Application No. 2016-027293, filed on

10 February 16, 2016, the content of which is incorporated herein by reference.

Background Art

[0002]

In recent years, detergent compositions are required to have a high
15 scent-lingering property (a property of causing scent to linger on a washed object after
washing) in addition to a function of removing stains which is a basic function.

In response to such requirements, the scent-lingering property has been
improved by blending a fragrance component that is likely to remain in a washed object
or by blending a cationic surfactant.

20 [0003]

For example, PTL 1 discloses a fragrance delivery system suitable for delivering
a fragrance to a surface using a composition containing polyethyleneimine and the
fragrance.

25 Citation List

Patent Literature

[0004]

[PTL 1] Japanese Unexamined Patent Application, First Publication No.

2010-31285

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Summary of Invention

Technical Problem

[0005]

However, in the related art, there is a limitation on fragrances that can be used,

10 or an insufficient effect is exhibited.

The present invention has been made in view of the above-described circumstances, and relates to a detergent composition having a high scent-lingering property. Furthermore, the present invention is also excellent in recontamination-preventing performance (performance of preventing stains from re-adhering to a washed object after washing).

15

Solution to Problem

[0006]

As a result of intensive studies, the present inventors have found that the above-mentioned problems can be solved by the following detergent composition.

20

That is, the present invention has the following aspects.

[1] A detergent composition including:

an alkylene oxide adduct (A) of a polyalkyleneamine;

a surfactant (B) containing a nonionic surfactant (B1) and an anionic surfactant

25 (B2); and

a fragrance (C),

in which a mass ratio represented by component (B1)/component (B2) is 1.0 or more.

[2] The detergent composition according to [1], in which the component (B1) contains a fatty acid methyl ester ethoxylate, and a content of the fatty acid methyl ester ethoxylate is equal to or higher than 10% by mass with respect to a total mass of the component (B).

[3] The detergent composition according to [1] or [2], further including: a component (D) which is a polymer having at least one repeating unit (d1) selected from the group consisting of an alkylene terephthalate unit and an alkylene isophthalate unit, and an oxyalkylene unit (d2).

[4] The detergent composition according to any one of [1] to [3], further including: a component (E) which is at least one selected from carboxylic acids represented by General Formula (VII) and salts thereof; and a component (F) which is an enzyme,



in Formula (VII), R^1 is a divalent hydrocarbon group having 1 to 4 carbon atoms or an arylene group, and X is -H, -OH, -CH₃, or -COOH.

Advantageous Effects of Invention

[0007]

According to the present invention, it is possible to provide a detergent composition having a high scent-lingering property.

Description of Embodiments

[0008]

<<Detergent composition>>

The detergent composition of the present invention contains the following components (A) to (C).

5 [0009]

<Component (A)>

Component (A) is an alkylene oxide adduct of a polyalkyleneamine.

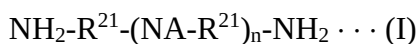
Examples of the component (A) include the following components (a1) and (a2).

[0010]

10 [Component (a1)]

The component (a1) is an alkylene oxide adduct of a polyalkyleneimine.

The polyalkyleneimine of the component (a1) is represented, for example, by General Formula (I).



15 In Formula (I), R²¹'s each independently represent an alkylene group having 2 to 6 carbon atoms, A represents a hydrogen atom or another branched polyamine chain, and n is an integer of 1 or more, where all A's are not hydrogen atoms.

That is, the polyalkyleneimine represented by Formula (I) has a branched polyamine chain in a structure.

20 [0011]

R²¹ is a linear alkylene group having 2 to 6 carbon atoms or a branched alkylene group having 3 to 6 carbon atoms. R²¹ is preferably an alkylene group having 2 to 4 carbon atoms, and more preferably an alkylene group having 2 carbon atoms.

The polyalkyleneimine is obtained by polymerizing one type or two or more
25 types of alkyleneimines having 2 to 6 carbon atoms with an ordinary method. As the

alkyleneimine having 2 to 6 carbon atoms, ethyleneimine, propyleneimine, 1,2-butyleneimine, 2,3-butyleneimine, 1,1-dimethylethyleneimine, and the like are mentioned.

As the polyalkyleneimine, polyethyleneimine (hereinafter also referred to as "PEI") (in Formula (I), R^{21} represents an ethylene group), polypropyleneimine (in Formula (I), R^{21} represents a propylene group) is preferable, and PEI is more preferable. PEI is obtained by polymerizing ethylenimine, and has a branched chain structure containing primary, secondary and tertiary amine nitrogen atoms in a structure thereof.

n is an integer of 1 or more.

10 [0012]

A mass average molecular weight of the polyalkyleneimine is preferably 200 to 2,000, more preferably 300 to 1,500, even more preferably 400 to 1,000, and particularly preferably 500 to 800.

[0013]

15 The polyalkyleneimine preferably has, in a molecule thereof, 5 to 30 active hydrogen atoms, more preferably 7 to 25 active hydrogen atoms, and even more preferably 10 to 20 active hydrogen atoms. Here, "active hydrogen atom" means a highly reactive hydrogen atom, and, specifically, means a hydrogen atom bound to a nitrogen atom.

20 [0014]

The component (a1) is obtained by adding an alkylene oxide to a polyalkyleneimine. Examples of such a method include a method of adding an alkylene oxide such as ethylene oxide with respect to a polyalkyleneimine which is a starting material at 100°C to 180°C in the presence of a basic catalyst such as sodium hydroxide, 25 potassium hydroxide, or sodium methyllate.

As the alkylene oxide, an alkylene oxide having 2 to 4 carbon atoms is mentioned. As the alkylene oxide, an ethylene oxide, a propylene oxide, and a butylene oxide are mentioned, with an ethylene oxide and a propylene oxide being preferable, and an ethylene oxide being more preferable.

5 [0015]

As the component (a1), an ethylene oxide adduct of a polyalkyleneimine, a propylene oxide adduct of a polyalkyleneimine, an ethylene oxide-propylene oxide adduct of a polyalkyleneimine, and the like are mentioned. The ethylene
oxide-propylene oxide adduct of polyalkyleneimine is obtained by adding an ethylene
10 oxide and a propylene oxide to the polyalkyleneimine, and an addition order and an addition form (block, random) of the ethylene oxide and the propylene oxide to the polyalkyleneimine are selected in a predetermined manner.

As the component (a1), the ethylene oxide adduct of polyalkyleneimine and the ethylene oxide-propylene oxide adduct of polyalkyleneimine are preferable, and the
15 ethylene oxide adduct of polyalkyleneimine is more preferable.

[0016]

As the component (a1), those obtained by adding an average of 5 to 40 alkylene oxides with respect to one active hydrogen atom of the polyalkyleneimine which is a raw material are preferable, and those obtained by adding an average of 10 to 30 alkylene
20 oxides are more preferable. That is, those obtained by adding an average of 5 to 40 mol of alkylene oxide per mol of active hydrogen atom of the polyalkyleneimine which is a raw material are preferable, and those obtained by adding an average of 10 to 30 mol of alkylene oxide is more preferable.

[0017]

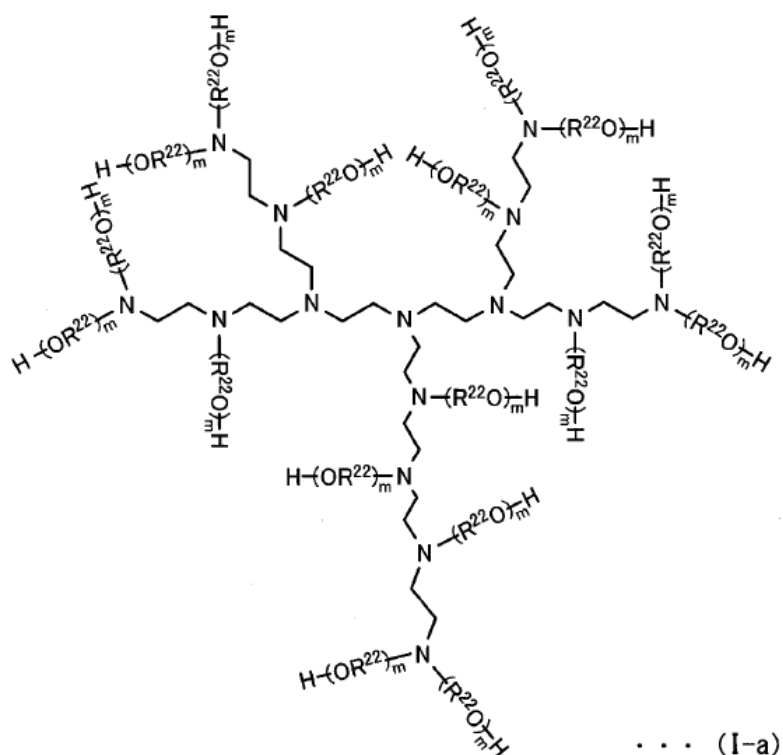
25 A mass average molecular weight of the component (a1) is preferably 1,000 to

80,000, more preferably 2,000 to 50,000, even more preferably 5,000 to 30,000, and particularly preferably 10,000 to 20,000.

The mass average molecular weight represents a value obtained by converting a value measured by gel permeation chromatography (GPC) using tetrahydrofuran (THF) as a solvent based on a calibration curve in polyethylene glycol (PEG).

As the component (a1), for example, a compound represented by Formula (I-a) is mentioned.

[0018]



10

[0019]

In Formula (I-a), R^{22} 's each independently represent an alkylene group having 2 to 6 carbon atoms, and m 's each independently represent the number of 1 or more.

R^{22} is preferably an alkylene group having 2 or 3 carbon atoms, and more preferably an alkylene group having 2 carbon atoms. m is an average repeating number of $(R^{22}O)$, with 5 to 40 being preferable, and 10 to 30 being more preferable.

15

In Formula (I-a), in $-(R^{22}O)_m-H$, $-R^{22}O-$ may be bound in a random form or may be bound in a block form.

As the component (a1), a synthetic product may be used, or a commercially available product may be used.

5 Examples of the commercially available product include a trade name "Sokalan HP20", manufactured by BASF.

[0020]

<Component (a2)>

The component (a2) is an alkylene oxide adduct of a polyalkyleneamine
10 represented by Formula (II).



In Formula (II), R^{31} is an alkylene group having 2 to 6 carbon atoms, and l is the number of 1 or more.

[0021]

15 R^{31} is a linear alkylene group having 2 to 6 carbon atoms or a branched alkylene group having 3 to 6 carbon atoms. R^{31} is preferably an alkylene group having 2 to 4 carbon atoms, and more preferably an alkylene group having 2 carbon atoms.

As the polyalkyleneamine, polyethyleneamine is preferable. As the polyethyleneamine, ethylenediamine, diethylenetriamine, triethylenetetramine,
20 tetraethylenepentamine, pentaethylenhexamine, and the like are mentioned. These polyethyleneamines can be obtained by a known production method, for example, by reacting ammonia and ethylene dichloride.

l is the number of 1 or more.

[0022]

25 A mass average molecular weight of the polyalkyleneamine is preferably 60 to

1,800, more preferably 60 to 1,000, and even more preferably 60 to 800.

[0023]

As the polyalkyleneamine, those having 6 to 30 active hydrogen atoms in a molecule thereof is preferable, and those having 7 to 20 active hydrogen atoms are more preferable.

[0024]

The component (a2) is obtained by adding an alkylene oxide to the polyalkyleneamine. This reaction is carried out in the same manner as the component (a1). As the alkylene oxide, an alkylene oxide having 2 to 4 carbon atoms is mentioned. As the alkylene oxide, an ethylene oxide, a propylene oxide, a butylene oxide, an ethylene oxide, a propylene oxide, and a butylene oxide are mentioned, with an ethylene oxide and a propylene oxide be preferable, and an ethylene oxide being more preferable.

[0025]

As the component (a2), an ethylene oxide adduct of the polyalkyleneamine, a propylene oxide adduct of the polyalkyleneamine, an ethylene oxide-propylene oxide adduct of the polyalkyleneamine, and the like are mentioned.

As the alkylene oxide adduct of polyalkyleneamine, the ethylene oxide adduct of polyalkyleneamine and the ethylene oxide-propylene oxide adduct of polyalkyleneamine are preferable, and the ethylene oxide adduct of polyalkyleneamine is more preferable.

[0026]

As the component (a2), those obtained by adding an average of 5 to 40 alkylene oxides with respect to one active hydrogen atom of the polyalkyleneamine which is a raw material are preferable, and those obtained by adding an average of 10 to 30 alkylene oxide are more preferable. That is, those obtained by adding an average of 5 to 40 mol of alkylene oxide per mol of active hydrogen atom of the polyalkyleneamine which is a

raw material are preferable, and those obtained by adding an average of 10 to 30 mol of alkylene oxide are more preferable.

[0027]

A mass average molecular weight of the component (a2) is preferably 1,000 to 80,000, more preferably 2,000 to 50,000, even more preferably 5,000 to 30,000, and particularly preferably 10,000 to 20,000.

[0028]

As the component (A), the component (a1) is preferable. Among the component (a1), the ethylene oxide adduct of polyethyleneimine represented by Formula (I-a) is particularly preferable.

[0029]

For the component (A), one type may be used alone, or two or more types may be used in combination.

A content of the component (A) is preferably 0.01% to 5% by mass, more preferably 0.05% to 3% by mass, and even more preferably 0.1% to 2% by mass, with respect to a total mass of the detergent composition.

In a case where the content of the component (A) is equal to or lower than the above upper limit value, a degree of freedom of blending of the other components is easily maintained.

In a case where the content of the component (A) is equal to or higher than the above lower limit value, a scent-lingering property is easily increased and a storage stability is easily increased.

[0030]

<Component (B)>

The component (B) is a surfactant containing a nonionic surfactant (hereinafter

also referred to as component (B1)) and an anionic surfactant (hereinafter also referred to as component (B2)).

[Component (B1)]

The component (B1) is a nonionic surfactant.

5 Examples of the component (B1) include the following (1) to (8).

(1) A polyoxyalkylene alkyl (or alkenyl) ether obtained by adding an average of 3 to 30 mol, preferably 3 to 20 mol, and more preferably 5 to 20 mol, of an alkylene oxide having 2 to 4 carbon atoms to a monohydric aliphatic alcohol having 6 to 22 carbon atoms, and preferably 8 to 18 carbon atoms. Among these, polyoxyethylene
10 alkyl (or alkenyl) ether and polyoxyethylene polyoxypropylene alkyl (or alkenyl) ether are suitable. As the monohydric aliphatic alcohol used here, primary alcohols and secondary alcohols are mentioned. In addition, an alkyl group thereof may have a branched chain. The aliphatic alcohol is preferably a primary alcohol.

(2) A polyoxyethylene alkyl (or alkenyl) phenyl ether.

15 (3) A fatty acid alkyl ester alkoxylate in which alkylene oxide is added into an ester bond of long chain fatty acid alkyl ester.

(4) A polyoxyethylene sorbitan fatty acid ester.

(5) A polyoxyethylene sorbitol fatty acid ester.

(6) A polyoxyethylene fatty acid ester.

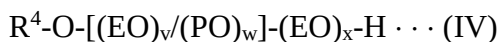
20 (7) A polyoxyethylene hardened castor oil.

(8) A glycerin fatty acid ester.

[0031]

As the nonionic surfactant, those of the above (1) or (3) are preferable, and among these, those represented by General Formula (III) or (IV) are preferable.

25
$$R^2-C(=O)O-[(EO)_s/(PO)_t]-(EO)_u-R^3 \cdots (III)$$



(In Formula (III), R^2 is a hydrocarbon group having 7 to 22 carbon atoms, R^3 is an alkyl group having 1 to 6 carbon atoms, s represents an average repeating number of EO and is the number of 6 to 20, t represents an average repeating number of PO and is the number of 0 to 6, u represents an average repeating number of EO and is the number from 0 to 20, EO represents an oxyethylene group, and PO represents an oxypropylene group.

In Formula (IV), R^4 is a hydrocarbon having 6 to 22 carbon atoms, v represents an average repeating number of EO and is the number of 3 to 20, w represents an average repeating number of PO and is the number of 0 to 6, x represents an average repeating number of EO and is the number of 0 to 20, EO represents an oxyethylene group, and PO represents an oxypropylene group.)

[0032]

In Formula (III), R^2 is a hydrocarbon group having 7 to 22 carbon atoms. The number of carbon atoms of R^2 is preferably 9 to 21, and more preferably 11 to 21.

R^2 is preferably an alkyl group or an alkenyl group.

R^2 may be either linear or branched.

From the viewpoint of further improving a detergent power, R^2 is preferably a linear or branched alkyl group having 7 to 22 carbon atoms, or a linear or branched alkenyl group having 7 to 22 carbon atoms.

R^3 is an alkyl group having 1 to 6 carbon atoms which may be either linear or branched. Among these, a methyl group and an ethyl group are preferable.

In Formula (III), s and u each independently represent a number representing the average repeating number of EO.

$s + u$ is preferably 6 to 20, more preferably 6 to 18, even more preferably 11 to

18, and particularly preferably 14 to 18. In a case where $s + u$ is equal to or higher than the above lower limit value, it is likely that a liquid stability is further improved. In a case where $s + u$ is equal to or lower than the above upper limit value, it is likely that a detergent power is further improved.

5 In Formula (III), t is a number representing the average repeating number of PO.

t is the number of 0 to 6, preferably 0 to 3, and more preferably 0. In a case where t is equal to or lower than the above upper limit value, it is likely that a liquid stability is further improved.

In a case where t is 1 or more, in $[(EO)_s/(PO)_t]$, the oxyethylene group and the
10 oxypropylene group may be bound to each other in a random form or in a block form.

In the present specification, the average repeating number can be measured by gas chromatography or the like.

[0033]

In Formula (IV), R^4 is a hydrocarbon group having 6 to 22 carbon atoms.

15 In Formula (IV), the number of carbon atoms of R^4 is preferably 10 to 22, more preferably 10 to 20, and even more preferably 10 to 18, from the viewpoint of further improving a detergent power.

R^4 may be linear or branched.

Preferable examples of R^4 -O- include groups represented by General Formula
20 (V).

$(R^{101})(R^{102})CH-O- \cdots (V)$

(In Formula (V), R^{101} and R^{102} each independently represent a hydrogen atom or a chain-like hydrocarbon group, and a total number of carbon atoms of R^{101} and R^{102} is 5 to 21).

25 The total number of carbon atoms of R^{101} and R^{102} is preferably 9 to 21, more

preferably 9 to 19, and even more preferably 9 to 17.

R^{101} and R^{102} may be linear or branched.

Specifically, R^4 is preferably an alkyl group derived from a secondary alcohol having 12 to 14 carbon atoms.

5 In Formula (IV), v and x each independently represent a number representing the average repeating number of EO.

$v + x$ is preferably 3 to 20, more preferably 5 to 18, even more preferably 6 to 18, particularly preferably 11 to 18, and (still more) preferably 14 to 18.

In a case where $v + x$ is equal to or higher than the above lower limit value, it is likely
10 that a liquid stability is further improved. In a case where $v + x$ is equal to or lower than the above upper limit value, it is likely that a detergent power is further improved.

In Formula (IV), w is a number representing the average repeating number of PO.

w is the number of 0 to 6, preferably 0 to 3, and more preferably 0. In a case
15 where w is equal to or higher than the above upper limit value, it is likely that a liquid stability is further improved.

In a case where w is 1 or more, the oxyethylene group and the oxypropylene group in $[(EO)_v/(PO)_w]$ may be bound to each other in a random form or in a block form.

A distribution of EO or PO in Formula (III) varies depending on a reaction
20 method at the time of production. For example, in a case where the ethylene oxide or propylene oxide is added to a raw material using a common alkaline catalyst such as sodium hydroxide or potassium hydroxide, a distribution of v or w becomes relatively wide. In a case where the ethylene oxide or propylene oxide is added to a raw material using a specific alkoxylation catalyst such as magnesium oxide to which a metal ion such
25 as Al^{3+} , Ga^{3+} , In^{3+} , Tl^{3+} , Co^{3+} , Sc^{3+} , La^{3+} , and Mn^{2+} is added as described in Japanese

Examined Patent Application, Second Publication No. H6-15038, the distribution of v or w becomes relatively narrow.

[0034]

In the nonionic surfactant represented by Formula (III) (hereinafter also referred
5 to as a component (b11)) and the nonionic surfactant represented by Formula (IV)
(hereinafter also referred to as a component (b12)), a narrow rate is preferably equal to or
higher than 20% by mass, and more preferably equal to or higher than 25% by mass.

The higher the narrow rate, the better a detergent power is obtained. In
addition, in a case where the narrow rate is equal to or higher than 20% by mass, and
10 particularly equal to or higher than 25% by mass, a detergent composition having less
raw material smell of a surfactant is easily obtained.

In a case where the component (b11) is produced by an ordinary method, in the
product, components that do not contribute to a detergent power, for example, a fatty acid
ester which is a raw material of the component (b11) and an ethylene oxide adduct in
15 which s of the nonionic surfactant represented by Formula (III) is 1 or 2 coexist together
with the component (b11), and a decreased narrow rate is caused. Therefore, in a case
where the narrow rate is high, coexisting components are sufficiently small, and
problems of decreased detergent power and raw material smell hardly occur. This also
applies to the component (b12).

20 An upper limit value of the narrow rate is not particularly limited, and
substantially 80% by mass or less is preferable.

The narrow rate is preferably 20 to 50% by mass and more preferably 20 to 40%
by mass, from the viewpoint of improved liquid stability and solubility.

Here, in the present specification, the "narrow rate" refers to a proportion of
25 distribution of an ethylene oxide adduct having a different addition molar number of EO

added, and is represented by Expression (S).

[0035]

$$\text{Narrow rate} = \sum_{i=p_{\max}-2}^{i=p_{\max}+2} Y_i \quad \cdot \cdot \cdot \quad (\text{S})$$

[0036]

5 [In the expression, $p_{\max}$ represents an addition molar number of EO in an ethylene oxide adduct which is present most frequently in the whole ethylene oxide adducts. i represents an addition molar number of EO. Y_i represents a proportion (% by mass) of an ethylene oxide adduct, of which an addition molar number of EO is i , present in the whole ethylene oxide adducts.]

10 [0037]

The narrow rate can be controlled by, for example, a method of producing the component (b11) or the component (b12). There are no particular limitations on the method for producing the component (b11), and a method of performing an addition-polymerization of ethylene oxide to a fatty acid alkyl ester using, for example, a surface-modified composite metal oxide catalyst (see Japanese Unexamined Patent Application, First Publication No. 2000-144179) can be used for easy production thereof. As a method for producing the component (b12), for example, a method of performing an addition-polymerization of ethylene oxide to an alcohol having 6 to 22 carbon atoms using a surface-modified composite metal oxide catalyst can be used for production thereof.

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As suitable examples of the surface-modified composite metal oxide catalyst used in such methods, specifically, composite metal oxide catalysts such as magnesium oxide to which a metal ion (such as Al^{3+} , Ga^{3+} , In^{3+} , Tl^{3+} , Co^{3+} , Sc^{3+} , La^{3+} , and Mn^{2+}) is

added, and a calcined product catalyst of hydrotalcite which is surface-modified with a metal hydroxide and/or a metal alkoxide, or the like are mentioned.

In a surface modification using the composite metal oxide catalyst, it is preferable to use a composite metal oxide in combination with a metal hydroxide and/or a metal alkoxide. In this case, a proportion of metal hydroxide and/or metal alkoxide is preferably 0.5 to 10 parts by mass and more preferably 1 to 5 parts by mass, with respect to 100 parts by mass of the composite metal oxide.

In addition, as another method for producing the component (b11), there is a method of adding an alkylene oxide to a fatty acid alkyl ester by using an alkoxylation catalyst prepared from a mixture of an alkaline earth metal compound and an oxyacid or the like. The above-mentioned alkoxylation catalysts are disclosed in Japanese Patent No. 04977609, PCT International Publication Nos. WO1993004030, WO2002038269, and WO2012028435, and the like, and examples thereof include alkoxylation catalysts prepared from mixtures of an alkaline earth metal salt of carboxylic acid and/or an alkaline earth metal salt of hydroxycarboxylic acid, and sulfuric acid or the like.

[0038]

As the nonionic surfactant, a commercially available product may be used, or one produced by a known synthesis method may be used. As a known production method, the component (b11) can be produced, for example, by a method of performing an addition-polymerization of an ethylene oxide and/or a propylene oxide to fatty acid alkyl ester. The component (b12) can be produced, for example, by a method of performing an addition-polymerization of an ethylene oxide and/or a propylene oxide to an alcohol having 6 to 22 carbon atoms.

[0039]

For the component (B1), one type may be used alone, or two or more types may

be used in combination.

As the component (B1), the component (b11) is preferable. A compound of Formula (III) in which t is 0 (that is, polyoxyethylene fatty acid alkyl ester) is more preferable, and polyoxyethylene fatty acid methyl ester (fatty acid methyl ester ethoxylate) (hereinafter referred to as "MEE") of Formula (III) in which R³ is a methyl group is particularly preferable.

A content of the fatty acid methyl ester ethoxylate is preferably equal to or higher than 10% by mass, more preferably 15 to 90% by mass, and even more preferably 20 to 80% by mass, with respect to a total mass of the component (B).

In a case where the content of the fatty acid methyl ester ethoxylate is equal to or lower than the above upper limit value, a scent-lingering property is easily increased.

In a case where the content of the fatty acid methyl ester ethoxylate is equal to or higher than the above lower limit value, a scent-lingering property is easily increased and a recontamination-preventing performance is easily increased.

[0040]

In the detergent composition of the present invention, it is preferable to use the component (b11) and the component (b12) in combination.

A mass ratio represented by component (b11)/component (b12) (hereinafter also referred to as b11/b12 ratio) is preferably 0.1 to 65 and more preferably 0.5 to 50.

In a case where the b11/b12 ratio is within the above-mentioned range of numerical values, a scent-lingering property is easily increased and a recontamination-preventing performance is easily increased.

[0041]

A content of the component (B1) is preferably 20 to 90% by mass, more preferably 25 to 80% by mass, and even more preferably 30 to 70% by mass, with

respect to a total mass of the component (B).

In a case where the content of the component (B1) is equal to or lower than the above upper limit value, a scent-lingering property is easily increased.

In a case where the content of the component (B1) is equal to or higher than the
5 above lower limit value, a scent-lingering property is easily increased and a recontamination-preventing performance is easily increased.

[0042]

A content of the component (B1) is preferably 20 to 70% by mass, more preferably 20 to 60% by mass, even more preferably 35 to 60% by mass, and particularly
10 preferably 40 to 60% by mass, with respect to a total mass of the detergent composition.

In a case where the content of the component (B1) is equal to or lower than the above upper limit value, a scent-lingering property is easily increased.

In a case where the content of the component (B1) is equal to or higher than the above lower limit value, a scent-lingering property is easily increased and a
15 recontamination-preventing performance is easily increased.

[0043]

A mass ratio represented by component (A)/component (B1) (hereinafter also referred to as A/B1 ratio) is preferably 0.001 to 1.0, more preferably 0.005 to 0.5, and even more preferably 0.01 to 0.25.

20 In a case where the A/B1 ratio is equal to or lower than the above upper limit value, a scent-lingering property is easily increased and a recontamination-preventing performance is easily increased.

In a case where the A/B1 ratio is equal to or higher than the above lower limit value, a scent-lingering property is easily increased.

25 [0044]

[Component (B2)]

Component (B2) is an anionic surfactant.

Examples of the anionic surfactant include the following (1) to (12).

(1) A methyl, ethyl, or propyl ester salt of a saturated or unsaturated α -sulfo fatty
5 acid having 8 to 20 carbon atoms.

(2) A linear or branched alkylbenzenesulfonate (LAS or ABS) having an alkyl
group having 8 to 18 carbon atoms.

(3) An alkanesulfonate having 10 to 20 carbon atoms.

(4) A α -olefin sulfonate (AOS) having 10 to 20 carbon atoms.

10 (5) An alkyl sulfate or alkenyl sulfate (AS) having 10 to 20 carbon atoms.

(6) A polyoxyalkylene alkyl (or alkenyl) ether sulfate (AES) having a linear or
branched alkyl (or alkenyl) group having 10 to 20 carbon atoms, to which any of
alkylene oxides having 2 to 4 carbon atoms, or an ethylene oxide (EO) and a propylene
oxide (PO) (molar ratio of EO/PO = 0.1/9.9 to 9.9/0.1) are added in an average of 0.5 to
15 10 mol.

(7) An alkyl (or alkenyl) phenyl ether sulfate having a linear or branched alkyl
(or alkenyl) group having 10 to 20 carbon atoms, to which any of alkylene oxides having
2 to 4 carbon atoms, or an ethylene oxide and a propylene oxide (molar ratio of EO/PO =
0.1/9.9 to 9.9/0.1) are added in an average of 3 to 30 mol.

20 (8) An alkyl (or alkenyl) ether carboxylate having a linear or branched alkyl (or
alkenyl) group having 10 to 20 carbon atoms, to which any of alkylene oxides having 2
to 4 carbon atoms, or an ethylene oxide and a propylene oxide (molar ratio of EO/PO =
0.1/9.9 to 9.9/0.1) are added in an average of 0.5 to 10 mol.

(9) An alkyl polyhydric alcohol ether sulfate such as an alkyl glyceryl ether
25 sulfonic acid having 10 to 20 carbon atoms.

(10) A long chain (having 8 to 20 carbon atoms) monoalkyl, dialkyl, or sesquialkyl phosphate.

(11) A polyoxyethylene monoalkyl, dialkyl, or sesquialkyl phosphate.

(12) A higher fatty acid or a salt thereof. A higher fatty acid having 10 to 20 average carbon atoms (preferably 12 to 18 carbon atoms) or a salt thereof.

[0045]

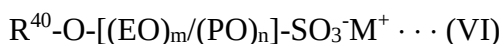
Anionic surfactants other than those exemplified above may be used.

Examples thereof include carboxylic acid-type anionic surfactants such as alkyl ether carboxylate, polyoxyalkylene ether carboxylate, alkylamide ether carboxylate or alkenyl amide ether carboxylate, and acyl aminocarboxylate; and phosphate-type anionic surfactants such as alkyl phosphate ester salts, polyoxyalkylene alkyl phosphate salts, polyoxyalkylene alkyl phenyl phosphate ester salts, and glycerin fatty acid ester monophosphate ester salts.

As the anionic surfactant, one described in the above (2) or (6) is preferred.

[0046]

As the polyoxyalkylene alkyl ether sulfate of (6), specifically, a compound represented by General Formula (VI) is preferable.



[In Formula (VI), R^{40} is a linear or branched alkyl group having 8 to 20 carbon atoms. EO represents an oxyethylene group, and PO represents an oxypropylene group. m represents an average repeating number of EO and is the number of 1 or more. n represents an average repeating number of PO and is the number from 0 to 6. M^+ is a counter cation. In a case where n is higher than 0, PO and EO in $[(PO)_m(EO)_n]$ may be arranged in a block form or in a random form. In addition, in PO and EO, PO may be bound to " $R^{40}-O-$ " or EO may be bound to " $R^{40}-O-$ ".]

As the polyoxyalkylene alkyl ether sulfate, those having a linear or branched alkyl group of 10 to 20 carbon atoms and having an average of 1 to 5 mol of alkylene oxide added thereto are preferable.

The number of carbon atoms of the alkyl group is preferably 10 to 20, and more preferably 12 to 14. Specifically, a dodecyl group, a tridecyl group, a tetradecyl group, and the like are mentioned. Among these, a dodecyl group is preferable.

An average repeating number of EO is preferably 1 to 5, and more preferably 1 to 3.

An average repeating number of PO is preferably 0 to 3, and more preferably 0.

It is preferable that the compound of Formula (VI) in which $m = 0$ and $n = 0$ is contained in an amount of 35 to 55% by mass with respect to the entire polyoxyalkylene alkyl ether sulfates represented by Formula (VI).

[0047]

As a salt form of the anionic surfactant, an alkali metal salt such as a sodium salt and a potassium salt; an alkaline earth metal salt such as a magnesium salt; an alkanolamine salt such as a monoethanolamine salt and a diethanolamine salt; an ammonium salt, and the like are mentioned. Among these, an alkali metal salt is preferable.

[0048]

As a method for producing the anionic surfactant, for example, LAS can be produced by a method in which alkylbenzene is sulfonated with sulfuric anhydride and is neutralized with an alkali. For example, AES can be produced by a method in which polyoxyalkylene alkyl ether is sulfonated by being reacted with sulfuric anhydride or chlorosulfonic acid and neutralized with an alkali.

[0049]

In the detergent composition of the present invention, it is preferable to use AES, LAS, and a higher fatty acid, or salts thereof in combination.

[0050]

For the component (B2), one type may be used alone, or two or more types may
5 be used in combination.

A content of the component (B2) is preferably 2 to 50% by mass, more preferably 5 to 45% by mass, and even more preferably 10 to 40% by mass, with respect to a total mass of the component (B).

In a case where the content of the component (B2) is equal to or lower than the
10 upper limit value, a scent-lingering property is easily increased.

In a case where the content of the component (B2) is equal to or higher than the above-mentioned lower limit value, a recontamination-preventing performance is easily increased while increasing a scent-lingering property.

[0051]

15 The content of the component (B2) is preferably 1 to 40% by mass, more preferably 2 to 35% by mass, and even more preferably 5 to 30% by mass, with respect to a total mass of the detergent composition.

In a case where the content of the component (B2) is equal to or lower than the upper limit value, a scent-lingering property is easily increased.

20 In a case where the content of the component (B2) is equal to or higher than the above-mentioned lower limit value, a recontamination-preventing performance is easily increased while increasing a scent-lingering property.

[0052]

A mass ratio represented by component (A)/component (B2) (hereinafter also
25 referred to as A/B2 ratio) is preferably 0.01 to 5, more preferably 0.05 to 2, and even

more preferably 0.1 to 1.

In a case where the A/B2 ratio is equal to or lower than the above upper limit value, a recontamination-preventing performance is easily increased while increasing a scent-lingering property.

5 In a case where the A/B2 ratio is equal to or more than the above-mentioned lower limit value, a scent-lingering property is easily increased.

[0053]

A mass ratio represented by component (B1)/component (B2) (hereinafter also referred to as B1/B2 ratio) is 1.0 or more, preferably higher than 1.0, more preferably 1.5
10 or more, and particularly preferably 2.0 or more. In addition, the B1/B2 ratio is preferably 30 or less, more preferably 15 or less, and even more preferably 10 or less. Specifically, the B1/B2 ratio is preferably 1.0 to 30, more preferably 1.0 to 15, and even more preferably 1.5 to 10.

In a case where the B1/B2 ratio is equal to or lower than the above upper limit
15 value, a recontamination-preventing performance is easily increased while increasing a scent-lingering property.

In a case where the B1/B2 ratio is equal to or higher than the above lower limit value, a scent-lingering property is easily increased.

[0054]

20 [Cationic surfactant]

Examples of the cationic surfactant include a cationic surfactant such as an alkyltrimethylammonium salt, a dialkyldimethylammonium salt, an alkylbenzyl
alkylbenzyltrimethylammonium salt, and an alkylpyridinium salt. As these salts, alkali metal salts such as sodium and potassium, alkaline earth metal salts such as magnesium,
25 and alkanolamine salts such as monoethanolamine and diethanolamine are mentioned.

[0055]

For the cationic surfactant, one type may be used alone, or two or more types may be used in combination. A content of the cationic surfactant is preferably 0 to 10% by mass, and more preferably 0 to 5% by mass, with respect to a total mass of the
5 detergent composition.

[0056]

[Amphoteric surfactant]

Examples of the amphoteric surfactant include alkylbetaine-type, alkylamidobetain-type, imidazoline-type, alkylaminosulfone-type, alkylaminocarboxylic
10 acid-type, alkylamidocarboxylic acid-type, amidoamino acid type, and phosphoric acid-type amphoteric surfactants.

For the amphoteric surfactant, one type may be used alone, or two or more types may be used in combination.

A content of the amphoteric surfactant is preferably 0 to 10% by mass, and more
15 preferably 0 to 5% by mass, with respect to a total mass of the detergent composition.

[0057]

A content of the component (B) is 15 to 70% by mass, and more preferably 20 to 65% by mass, with respect to a total mass of the detergent composition.

In a case where the content of the component (B) is equal to or lower than the
20 above upper limit value, a scent-lingering property is easily increased.

In a case where the content of the component (B) is equal to or higher than the above-mentioned lower limit value, a recontamination-preventing performance is easily increased while increasing a scent-lingering property.

[0058]

25 <Component (C)>

Component (C) is a fragrance.

Component (C) is a fragrance. "Fragrance" contains at least one fragrance component, and if necessary, a solvent (solvent for fragrance) is blended therewith. The fragrance component is selected appropriately depending on a desired scent, and usually
5 a plurality of fragrance components are combined.

The fragrance components are not particularly limited, and fragrance components commonly used in detergents, finishing agents for fibers, hair cosmetics, and the like can be used. Specific examples of such fragrance components include phenols, alcohols, carboxylic acids, aldehydes, ethers, esters, hydrocarbons, ketones, lactones,
10 musks, natural fragrances, and animal-derived fragrances as shown below.

The carboxylic acids are not particularly limited and can be appropriately selected depending on purposes. Examples thereof include geranylic acid, citronellic acid, phenylpropionic acid, cinnamic acid, 2-methyl-2-pentenoic acid, anthranilic acid, benzoic acid, and phenylacetic acid.

15 The phenols are not particularly limited and can be appropriately selected depending on purposes. Examples thereof include eugenol, isoeugenol, methyl isoeugenol, ethyl isoeugenol, ethyl eugenol, benzyl eugenol, benzyl isoeugenol, acetyl eugenol, acetyl isoeugenol, methyl eugenol, raspberry ketone, vanillin propylene glycol acetal, ethyl salicylate, and benzyl salicylate.

20 The alcohols are not particularly limited and can be appropriately selected depending on purposes. Examples thereof include bacdanol, citronellol, dihydromyrcenol, dihydrolinalool, geraniol, linalool, nerol, sanderol, Santarex, Terpeneol, tetrahydrolinalool, phenylethyl alcohol, trans-2-hexenol, trans-3-hexenol, myrcenol, dihydromyrcenol, tetrahydromyrcenol, terpeneol, farnesol, nerolidol, 1-octanol,
25 1-nonanol, leaf alcohol, menthol, matsutakeol, 1,8-cineole, chavicol, carvacrol, cuminal

alcohol, anis alcohol, thymol, tetrahydrolinalool, benzyl alcohol, β -phenyl alcohol, β -phenylethyl alcohol, styrallyl alcohol, cinnamic alcohol, phenoxyethyl alcohol, linalool oxide, guaiacol, hydroxycitronellal, nerol, cedrol, santalinol, amburinol, timberol, borneol, isoborneol, Polysantol, vanillin, maltol, ethyl maltol, vetiverol, patchouli alcohol, 5 orthithiol, anethole, 4-damascol, and galbanum resinoid.

The aldehydes are not particularly limited and can be appropriately selected depending on purposes. Examples thereof include undecylenaldehyde, laurylaldehyde, aldehyde C-12 MNA, Myrac aldehyde, α -amyl cinnamic aldehyde, cyclamenaldehyde, citral, Citronellal, ethyl vanillin, heliotropin, anisaldehyde, α -hexyl cinnamic aldehyde, 10 octanal, ligustral, lilial, lyral, tripleal, vanillin, helional, nonanal, decanal, undecanal, dodecanal, cis 3-hexanal, benzaldehyde, Muget aldehyde, Dupical, Bourgeonal, cinnamic aldehyde, Jasmal, ligantraal and the like.

The ethers are not particularly limited and can be appropriately selected depending on purposes. Examples thereof include Cedramber, Grisalva, β -naphthol 15 methyl ether, β -naphthol ethyl ether, herboxide, and rose oxide.

The esters are not particularly limited and can be appropriately selected depending on purposes. Examples thereof include cis-3-hexenyl acetate, cis-3-hexenyl propionate, cis-3-hexenyl salicylate, p-cresol acetate, p-t-butyl cyclohexyl acetate, amyl acetate, methyl dihydrojasmonate, amyl salicylate, benzyl benzoate, benzyl acetate, 20 cedryl acetate, citronellyl acetate, decahydro- β -naphthyl acetate, dimethyl benzyl carbonyl acetate, Erika propionate, ethyl acetoacetate, Erika acetate, geranyl acetate, geranyl formate, citronellyl formate, neryl formate, hedione, linalyl acetate, β -phenylethyl acetate, tricyclodecenyl acetate, cinnamyl acetate, hexyl salicylate, styrallyl acetate, terpinyl acetate, vetiveryl acetate, o-t-butyl cyclohexyl acetate,

manzanate, allyl heptanoate, allyl amyl glycolate, ethyl acetate, neryl acetate, isobornyl acetate, methyl anthranilate, cis-3-hexenyl anthranilate, phenylethyl anthranilate, cinnamyl anthranilate, methyl N-methyl anthranilate, tricyclodecenyl propionate, benzyl propionate, methyl jasmonate, methyl cinnamate, ethyl cinnamate,
 5 ethyl-2,2,6-trimethylcyclohexane carbonate, and flutate.

The hydrocarbons are not particularly limited and can be appropriately selected depending on purposes. Examples thereof include d-limonene, α -pinene, β -pinene, myrcene, 3-carene, β -caryophyllene, p-cymene, cedrene, citronellyl nitrile, lemongrass, indole, 6-isopropyl quinoline, isobutyl quinoline, 2-isobutyl quinoline, benzothiazole,
 10 and mint sulfide.

The ketones are not particularly limited and can be appropriately selected depending on purposes. Examples thereof include α -ionone, β -ionone, methyl- β -naphthyl ketone, α -damascone, β -damascone, δ -damascone, cis-jasmone, methylionone, allylionone, Cashmeran, dihydrojasmon, Vertofix, Isolongifolanon,
 15 Koavone, rose phenone, dynascone, nootkatone, carvone, menthone, floralozone, damascenone, calone, isojasmon, ionone, methylionone, tonalid, verdox, and Iso E Super.

The lactones are not particularly limited and can be appropriately selected depending on purposes. Examples thereof include γ -decalactone, γ -undecalactone,
 20 γ -nonalactone, γ -dodecalactone, coumarin, ambroxan, ambrettolide, pentalide, habanolide, and traseolide.

The musks are not particularly limited and can be appropriately selected depending on purposes. Examples thereof include cyclopentadecanolide, ethylene brassylate, galaxolide, musk ketone, tonalide, nitromusk, musk ambrette, musk tibetene,

muscone, ambrettolide, and cyclohexadecanolide.

The natural fragrance is not particularly limited and can be appropriately selected depending on purposes. Examples thereof include essential oils such as orange oil, lemon oil, lime oil, Petit Grain oil, yuzu oil, neroli oil, bergamot oil, lavender oil, lavandin oil, Abies oil, anise oil, bay oil, Bois de rose oil, ylang ylang oil, citronella oil, geranium oil, peppermint oil, mentha oil, spearmint oil, eucalyptus oil, lemon grass oil, jasmine oil, rose oil, cedar oil, vetiver oil, galbanum oil, oak moss oil, pine oil, camphor oil, sandalwood oil, petroleum oil, turpentine oil, clove oil, clove leaf oil, cassia oil, nutmeg oil, cananga oil, thyme oil, mandarin oil, basil oil, fennel oil, clary sage oil, rosemary oil, caraway seed oil, coriander oil, sandalwood oil, Ambrette seed oil, Elemio oleoresin, Elemi absolute, Guaiac wood oil, styrax oil, patchouli oil, labdanum oil, mimosa concrete, jasmine concrete, rose concrete, rose wax, jasmine wax, orange flower absolute, violet absolute, opopanax resinoid, castoreum absolute, iris resinoid, olibanum resinoid, copaiba balsam, tolu balsam, vanilla absolute, and benzoin resinoid.

The animal-derived fragrances are not particularly limited and can be appropriately selected depending on purposes. Examples thereof include musk, civet, castreum, and ambergris.

[0059]

Examples of the solvent for fragrance include ethanol, acetone (triacetin), 3-methoxy-3-methylbutyl acetate (MMB acetate), sucrose diacetate hexaisobutyrate, ethylene glycol dibutyrate, hexylene glycol, dibutyl sebacate, Deltyl Extra (isopropyl myristate), methyl carbitol (diethylene glycol monomethyl ether), carbitol (diethylene glycol monoethyl ether), triethylene glycol (TEG), benzyl benzoate, propylene glycol, diethyl phthalate, tripropylene glycol, avorin (dimethyl phthalate), Deltyl Prime (isopropyl palmitate), dipropylene glycol DPG-FC (dipropylene glycol), farnesene,

dioctyl adipate, tributyrin (glyceryl tributanoate), hydrolyte-5 (1,2-pentanediol), propylene glycol diacetate, cetyl acetate (hexadecyl acetate), ethyl abietate, abarin (methyl abietate), Citroflex A-2 (acetyl triethyl citrate), Citroflex A-4 (tributyl acetyl citrate), Citroflex No. 2 (triethyl citrate), Citroflex No. 4 (tributyl citrate), Durafix 5 (methyl dihydroabietate), isotridecyl myristate (MITD), polyrimonene (limonene polymer), 1,3-butylene glycol, dibutyl hydroxytoluene, and Hercolyne.

[0060]

The component (C) contains a compound having at least one functional group selected from the group consisting of a hydroxyl group and a carboxyl group in an amount of, preferably 30 to 75% by mass, and more preferably 40 to 50% by mass, with respect to a total mass of the component (C).

Examples of the compound having at least one functional group selected from the group consisting of a hydroxyl group and a carboxyl group include carboxylic acids, phenols, and alcohols among the afore-mentioned fragrance components.

15 [0061]

For the component (C), one type may be used alone, or two or more types may be used in combination.

A content of the component (C) is preferably 0.01 to 5% by mass, more preferably 0.05 to 3% by mass, and even more preferably 0.1 to 2% by mass, with respect to a total mass of the detergent composition.

In a case where the content of the component (C) is within the above-mentioned range of numerical values, a scent-lingering property is easily increased.

[0062]

A mass ratio represented by component (A)/component (C) (hereinafter also referred to as A/C ratio) is preferably 0.01 to 100, and more preferably 0.1 to 50.

In a case where the A/C ratio is within the above-mentioned range of numerical values, a scent-lingering property is easily increased.

A total of the components (A) to (C) does not exceed 100% by mass.

[0063]

5 <Component (D)>

Component (D) is a polymer having at least one repeating unit (d1) selected from the group consisting of an alkylene terephthalate unit and an alkylene isophthalate unit, and an oxyalkylene unit (d2).

10 In a liquid detergent of the present invention, the component (A) and the component (D) are used in combination, so that an effect of causing stains that had adhered to a washed object to be easily removed (soil release effect which is hereinafter also referred to as "SR effect") is further increased.

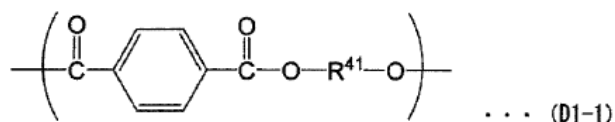
In the present specification, "repeating unit" refers to a monomer unit constituting a polymer.

15 [0064]

· Regarding specific repeating unit (d1)

Among specific repeating units (d1), as an alkylene terephthalate unit (hereinafter, this repeating unit is also referred to as "repeating unit (d11)"), a repeating unit represented by General Formula (D1-1) is mentioned.

20 [0065]



[0066]

In Formula (D1-1), R⁴¹ is a lower alkylene group. The number of carbon

atoms of the lower alkylene group in R^{41} is preferably 1 to 5, more preferably 1 to 4, and even more preferably 2 to 4.

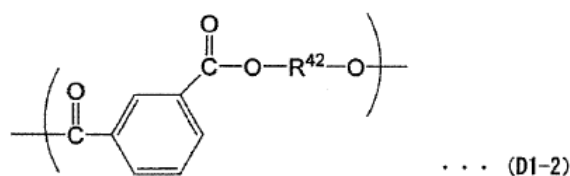
As the repeating unit (d11), specifically, an ethylene terephthalate unit, an n-propylene terephthalate unit, an isopropylene terephthalate unit, an n-butylene terephthalate unit, an isobutylene terephthalate unit, a sec-butylene terephthalate unit, and a tert-butylene terephthalate unit are mentioned. Among these, an isopropylene terephthalate unit is preferable.

As the repeating unit (d11), one type may be used alone, or two or more types may be used in combination.

10 [0067]

Among the specific repeating units (d1), as the alkylene isophthalate unit (hereinafter this repeating unit is also referred to as "repeating unit (d12)"), a repeating unit represented by General Formula (D1-2) is mentioned.

[0068]



15

[0069]

In Formula (D1-2), R^{42} is a lower alkylene group. The number of carbon atoms of the lower alkylene group in R^{42} is preferably 1 to 5, more preferably 1 to 4, and even more preferably 2 to 4.

20 As the repeating unit (d12), specifically, an ethylene isophthalate unit, an n-propylene isophthalate unit, an isopropylene an isophthalate unit, an n-butylene isophthalate unit, a sec-butylene isophthalate unit, and a tert-butylene isophthalate unit are mentioned. Among these, an isopropylene isophthalate unit is preferable.

For the repeating unit (d12), one type may be used alone, or two or more types may be used in combination.

[0070]

The component (D) may have only one type of the repeating unit (d1) or two or more types thereof. That is, the component (D) may have, in one molecule thereof, only the repeating unit (d11), only the repeating unit (d12), or both the repeating unit (d11) and the repeating unit (d12), as the repeating unit (d1).

In addition, two or more types of the repeating units (d11) and/or two or more types of the repeating units (d12) may be possessed.

The repeating unit (d1) may be introduced at one unit into one molecule, or may be introduced at two or more units (that is, in a block form) thereinto.

[0071]

A repeating number of the repeating unit (d1) possessed by one molecule in the component (D) is preferably 1 to 10, more preferably 1 to 6, and even more preferably 1 to 4.

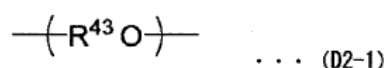
In a case where the number of the repeating unit (d1) is within the above-mentioned preferable range, a washing effect is easily increased.

[0072]

· Regarding oxyalkylene unit (d2)

As the oxyalkylene unit (hereinafter, this repeating unit is also referred to as "repeating unit (d2)"), a repeating unit represented by General Formula (D2-1) is mentioned.

[0073]



[0074]

In Formula (D2-1), R^{43} is a lower alkylene group. The number of carbon atoms of the lower alkylene group in R^{43} is preferably 1 to 4, more preferably 2 to 4, and even more preferably 2 or 3.

5 As the repeating unit (d2), an oxyethylene unit, an oxypropylene unit, an oxybutylene unit, and the like are mentioned. Among these, an oxyethylene unit and an oxypropylene unit are preferred.

[0075]

Component (D) may have only one type of the repeating unit (d2) or two or
10 more types thereof. That is, the component (D) may have, in one molecule thereof, only an oxyethylene unit, only an oxypropylene unit, or both the oxyethylene unit and the oxypropylene unit, as the repeating unit (d2).

In addition, the component (D) may have, in one molecule thereof, an oxyalkylene group (one having a repeating number of the repeating unit (d2) which is 1)
15 as the repeating unit (d2), a polyoxyalkylene group (one having a repeating number of the repeating unit (d2) which is 2), or both the oxyalkylene group and the polyoxyalkylene group, as the repeating unit (d2).

[0076]

The repeating number of the repeating unit (d2) possessed by one molecule in
20 the component (D) is 1 or more, preferably 1 to 100, more preferably 1 to 80, and even more preferably 1 to 50.

In a case where the repeating number of the repeating unit (d2) is within the above-mentioned preferable range, a washing effect against oily stains is easily increased.

25 [0077]

The component (D) may be a polymer in which the repeating unit (d1) and the repeating unit (d2) are polymerized in a block form or in a random form. Among these, as the component (D), a polymer polymerized in a block form is preferable.

[0078]

5 In addition to the repeating unit (d1) and the repeating unit (d2), the component (D) may have another repeating unit. As the other repeating unit, a repeating unit derived from a polymerization initiator, a polymerization terminator, or the like, a repeating unit derived from a monomer copolymerizable with a monomer providing the repeating unit (d1) or the repeating unit (d2), and the like are mentioned.

10 In a case where the other repeating unit is contained in the component (D), a total of the repeating unit (d1) and the repeating unit (d2) is preferably 80% by mol or more, and more preferably 90% by mol or more, with respect to the entire repeating units constituting the component (D), or may be 100% by mol. In a case where the total of the repeating unit (d1) and the repeating unit (d2) is equal to or higher than the
15 above-mentioned preferred lower limit, it is likely that a detergent power is further increased.

[0079]

The component (D) is preferably a water-soluble polymer from the viewpoints of a solubility of itself and a liquid stability in a case of being used as a liquid detergent.

20 The term "water-soluble polymer" as used herein means that after 10 g of a polymer is added to 1,000 g of water at a condition of 40°C in a 1 liter beaker and stirred (200 rpm) for 12 hours with a stirrer (8 mm in thickness, 50 mm in length), the polymer is dissolved.

[0080]

25 A weight average molecular weight of the component (D) is preferably 500 to

10,000. In a case where the weight average molecular weight is within the above range, a solubility in water is improved, and it is likely that an SR effect and a recontamination-preventing effect are further increased. In addition, a low-temperature stability of a liquid detergent is easily increased. A lower limit of the weight average molecular weight is more preferably 800 or more, and even more preferably 1,000 or more. On the other hand, an upper limit of the weight average molecular weight is more preferably 9,000 or less, and even more preferably 8,000 or less. The weight average molecular weight of component (D) is more preferably 800 to 9,000, and even more preferably 1,000 to 8,000.

10 The weight average molecular weight of component (D) represents a value obtained by converting a value measured by gel permeation chromatography (GPC) using tetrahydrofuran (THF) as a solvent based on a calibration curve in polyethylene glycol (PEG).

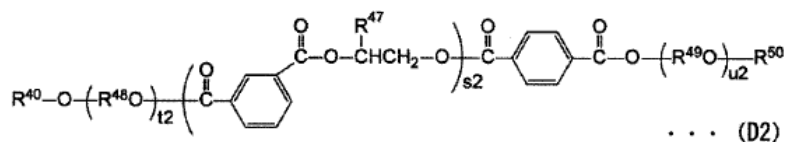
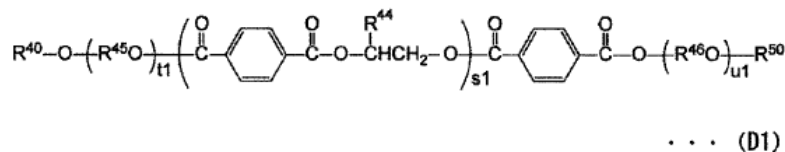
[0081]

15 The component (D) can be produced according to methods disclosed in various literature, textbooks, and patent literature, for example, those described in Journal of Polymer Science, Vol. 3, pages 609 to 630 (1948); Journal of Polymer Science, Vol. 8, pages 1 to 22 (1951); Japanese Unexamined Patent Application, First Publication No. S61-218699, and the like.

20 [0082]

Suitable specific examples of the component (D) include those containing a polymer compound represented by General Formula (D1), a polymer compound represented by General Formula (D2), or a mixture thereof.

[0083]



[0084]

In Formulas (D1) and (D2), R^{40} and R^{50} each independently represent a hydrogen atom or a methyl group. It is preferable that each of R^{40} and R^{50} is a methyl group, and it is more preferable that both of R^{40} and R^{50} are methyl groups.

R^{44} and R^{47} are each a methyl group or a hydrogen atom. It is preferable that each of R^{44} and R^{47} is a methyl group.

R^{45} , R^{46} , R^{48} , and R^{49} are each independently an alkylene group having 2 to 4 carbon atoms.

$s1$ and $s2$ are each 0 to 10, preferably 0.5 to 5, and more preferably 0.5 to 2.5. $t1$, $t2$, $u1$ and $u2$ are each independently 1 to 100, preferably 1 to 80, more preferably 1 to 50, even more preferably 10 to 50, and particularly preferably 20 to 30. In a case where $s1$, $s2$, $t1$, $t2$, $u1$, and $u2$ are in the above preferable ranges, a blending effect of the component (D) is likely to be exerted sufficiently. In addition, a further improved solubility in water is exhibited, and in a case where the component (D) is blended in a liquid detergent, a liquid detergent which is excellent in transparency is easily obtained.

[0085]

In (D1), $[s1: (t1 + u1)]$ which is a ratio of $s1$ to $(t1 + u1)$ is preferably 1: 5 to 1:20, and more preferably 1: 8 to 1:18. In a case where the ratio of $s1$ to $(t1 + u1)$ is within the above-mentioned preferable range, a detergent power is further increased and

a solubility in water is further increased.

[s2: (t2 + u2)] which is a ratio of s2 and (t2 + u2) in (D2) is preferably the same range as the ratio of [s1: (t1 + u1)].

[0086]

5 For the component (D), one type may be used alone, or two or more types may be used in combination.

In addition, as the component (D), a synthetic product may be used, and a commercially available product may be used.

As the commercially available products of the component (D), a trade name
10 TexCare SRN-100 (weight average molecular weight of 2,000 to 3,000, manufactured by Clariant), a trade name TexCare SRN-300 (weight average molecular weight of 7000, manufactured by Clariant), a trade name Repel-O-Tex Crystal (manufactured by Rhodia Inc.), a trade name Repel-O-Tex QC (manufactured by Rhodia Inc.), and the like are mentioned.

15 Among these, TexCare SRN-100 is preferable from the viewpoint of a high solubility in water and an excellent storage stability. In addition, from the viewpoint of excellent handling properties, it is preferable to use the trade name TexCare SRN-170 (manufactured by Clariant) which is commercially available as a 70% aqueous solution of TexCare SRN-100.

20 [0087]

A content of the component (D) is preferably 0.1 to 1.5% by mass, and more preferably 0.5 to 1% by mass, with respect to a total mass of the detergent. In a case where the content of the component (D) is equal to or higher than the above-mentioned lower limit value, it is likely that an SR effect is further increased. In addition, it is
25 likely that a recontamination-preventing effect is further increased. In a case where the

content of the component (D) is equal to or lower than the upper limit value, a blending stability to a liquid detergent is easily increased, and a low-temperature stability is easily increased.

[0088]

5 A total content of the components (A) and (D) in a liquid detergent [hereinafter also referred to as "(A + D) total content"] is preferably 0.1% to 3.5% by mass, more preferably 0.6% to 3.3% by mass, and even more preferably 1% to 3% by mass. In a case where the total content of (A + D) in a liquid detergent is equal to or higher than the above-mentioned lower limit value, it is likely that an SR effect is further increased. In
10 addition, it is likely that a recontamination-preventing effect is further increased. In a case where the total content of (A + D) in a liquid detergent is equal to or lower than the above upper limit value, it is likely that a low-temperature stability is further increased.

[0089]

 A mass ratio represented by component (A)/component (D) [mass ratio of a
15 content of component (A) to a content of component (D), hereinafter also referred to as "A/D ratio"] is preferably 0.5 to 4, and more preferably 1 to 3. In a case where the A/D ratio is within the above preferable range, it is likely that an SR effect is further increased.

 In addition, in a case where an average EO addition molar number of the
20 nonionic surfactant (B1) is 10 or more, an SR effect is further increased.

[0090]

<Component (E)>

The component (E) is at least one selected from carboxylic acids represented by General Formula (VII) and salts thereof.

25 $\text{X-R}^1\text{-COOH} \cdots \text{(VII)}$

In Formula (VII), R^1 is a divalent hydrocarbon group having 1 to 4 carbon atoms or an arylene group, and X is -H, -OH, -CH₃, or -COOH.

In a liquid detergent of the present invention, the component (B) and the component (E) are used in combination, so that an enzyme stability is increased.

5 [0091]

In Formula (VII), R^1 is a divalent hydrocarbon group having 1 to 4 carbon atoms or an arylene group. The divalent hydrocarbon group having 1 to 4 carbon atoms and the arylene group may or may not have a substituent. As the substituent, a hydroxy group and the like are mentioned.

10 In addition, the divalent hydrocarbon group having 1 to 4 carbon atoms may be saturated or unsaturated, and may be linear, branched, or cyclic. As such a divalent hydrocarbon group having 1 to 4 carbon atoms, a divalent group obtained by removing one hydrogen atom from an alkyl group having 1 to 4 carbon atoms, a divalent group obtained by removing one hydrogen atom from an alkenyl group having 1 to 4 carbon
15 atoms, a divalent group obtained by removing one hydrogen atom from an alkynyl group having 1 to 4 carbon atoms, and the like are mentioned.

As the arylene group, a phenylene group is mentioned.

X is -H, -OH, -CH₃, or -COOH.

[0092]

20 Examples of the carboxylic acids represented by Formula (VII) include benzoic acid, acetic acid, propionic acid, butyric acid, hydroxybutyric acid, hydroxyisobutyric acid, lactic acid, adipic acid, maleic acid, fumaric acid, phthalic acid, isophthalic acid, terephthalic acid, malic acid, and glutaric acid.

As the salts of carboxylic acids, a sodium salt, a potassium salt, a calcium salt, a
25 monoethanolamine salt, a diethanolamine salt, a triethanolamine salt, and the like are

mentioned.

Among these, as the component (E), from the viewpoint that an enzyme stability is further increased, benzoic acid or lactic acid, or salts thereof are preferable, and lactic acid or a salt thereof is more preferable. In addition, from the viewpoint of further
 5 increasing an appearance stability, a sodium salt is preferable as the component (E).

As component (E), from the viewpoint of further increasing an enzyme stability and an appearance stability, sodium lactate is preferable.

For the component (E), any one type may be used alone, or two or more types may be used in combination.

10 [0093]

A content of the component (E) is preferably 0.1% to 5% by mass, more preferably 0.1% to 3% by mass, and even more preferably 0.2% to 2% by mass, with respect to a total mass of the liquid detergent.

[0094]

15 <Component (F)>

Component (F) is an enzyme.

A detergent power of the liquid detergent of the present invention is further increased by containing the component (F).

As the component (F), enzymes used for an application of detergents for cloths
 20 and the like can be used, and examples thereof include a protease, an amylase, a lipase, a cellulase, and a mannanase.

In the present specification, "enzyme" means an enzyme preparation.

[0095]

As the protease, trade names Savinase 16L, Savinase Ultra 16L, Savinase Ultra
 25 16XL, Everlase 16L TypeEX, Everlase Ultra 16L, Esperase 8L, Alcalase 2.5L, Alcalase

Ultra 2.5L, Liquanase 2.5L, Liquanase Ultra 2.5L, Liquanase Ultra 2.5XL, Coronase 48 L, which are available from Novozymes, trade names Purafect L, Purafect OX, Properase L, which are available from Genencor, and the like are mentioned as protease preparations.

5 As the amylase, trade names Termamyl 300 L, Termamyl Ultra 300L, Duramyl 300L, Stainzyme 12L, Stainzyme Plus 12L, which are available from Novozymes, a trade name Maxamyl available from Genencor, a trade name Pullulanase Amano available from Amano Pharmaceutical Co., Ltd., a trade name DB-250 available from Seikagaku Kogyo Co., Ltd., and the like are mentioned as amylase preparations.

10 As the lipase, trade names Lipex 100L, Lipolase 100 L, which are available from Novozymes, and the like are mentioned as lipase preparations.

 As the cellulase, trade names Endolase 5000L, Celluzyme 0.4L, Carzyme 4500L, which are available from Novozymes, and the like are mentioned as cellulase preparations.

15 As the mannanase, a trade name Mannaway 4L available from Novozymes, and the like are mentioned as mannanase preparations.

[0096]

 Component (F) preferably contains a protease. A detergent power against protein stains is further increased by containing the protease.

20 As the protease, among these, trade names Savinase 16L, Savinase Ultra 16L, Savinase Ultra 16XL, Everlase 16L, Everlase Ultra 16L, Alcalase 2.5 L, Alcalase Ultra 2.5L, Liquanase 2.5L, Liquanase Ultra 2.5L, Liquanase Ultra 2.5XL, Coronase 48L are preferable, and Alcalase 2.5L, Everlase 16L, Savinase 16L, Coronase 48L are particularly preferable.

25 For the component (F), any one type may be used alone, or two or more types

may be used in combination.

[0097]

A content of the component (F) is preferably 0.01 to 3% by mass, more preferably 0.05 to 2% by mass, and even more preferably 0.1 to 1.5% by mass, with
5 respect to a total mass of the liquid detergent. In a case where the content of the component (D) is equal to or higher than a lower limit of the preferable range, a detergent power is further increased. In a case where the content of the component (D) is equal to or lower than an upper limit of the preferable range, precipitation of the enzyme is suppressed and an appearance stability is further increased.

10 In the present specification, a blending amount of the enzyme in the liquid detergent is a blending amount as a preparation. The blending amount is obtained by a general method, for example, by an inverse calculation from an amount of raw material used or an enzyme protein amount in the liquid detergent.

[0098]

15 [Mass ratio of a content of the component (A) to a content of the component (E), hereinafter also referred to as "A/E ratio"] which is a mass ratio represented by the component (A)/the component (E) is 0.1 to 20.

In a case where the A/E ratio is lower than 0.1 or higher than 20, an appearance stability is impaired.

20 The A/E ratio is preferably 0.3 to 10, more preferably 0.5 to 7, and even more preferably 1 to 5.

[0099]

A total content of the component (A) and the component (E) is preferably 0.1% to 4% by mass, more preferably 0.5% to 3% by mass, and even more preferably 1% to
25 2.5% by mass, with respect to a total mass of the liquid detergent. In a case where the

total content of the component (A) and the component (E) is equal to or higher than the above-mentioned lower limit, the A/E ratio is easily adjusted to a specific range of the present application and a liquid detergent having an excellent appearance stability is easily obtained. In addition, in a case where the total content of the component (A) and the component (E) is equal to or lower than the above upper limit value, a degree of freedom of blending of the other components is easily maintained.

[0100]

<Optional components>

In the detergent composition of the present invention, components ordinarily used in a detergent composition may be used depending on purposes as long as an effect of the present invention is not hindered.

The detergent composition of the present invention may contain an enzyme such as a protease, a water-miscible organic solvent such as ethanol, an alkaline agent such as monoethanolamine, an antioxidant such as dibutylhydroxytoluene, a preservative such as sodium benzoate, an enzyme stabilizing agent such as calcium chloride and sodium lactate, a coloring agent such as a pigment, zeolite, a detergency builder, and the like.

[0101]

The detergent composition of the present invention is preferably one in which the component (A) is at least one selected from the group consisting of compounds represented by General Formula (I) and compounds represented by General Formula (II), the component (B1) is at least one selected from the group consisting of compounds represented by General Formula (III) and compounds represented by General Formula (IV), the component (C) is at least one selected from the group consisting of phenols, alcohols, carboxylic acids, aldehydes, ethers, esters, hydrocarbons, ketones, lactones, musks, natural fragrances, and animal-derived fragrances, and a mass ratio represented

by component (B1)/component (B2) is 1.0 or more.

[0102]

The detergent composition of the present invention is preferably one in which the component (A) is at least one selected from the group consisting of compounds represented by General Formula (I) and compounds represented by General Formula (II), the component (B1) contains a fatty acid methyl ester ethoxylate, the component (C) is at least one selected from the group consisting of phenols, alcohols, carboxylic acids, aldehydes, ethers, esters, hydrocarbons, ketones, lactones, musks, natural fragrances, and animal-derived fragrances, and a mass ratio represented by component (B1)/component (B2) is 1.0 or more.

[0103]

The detergent composition of the present invention is preferably one in which the component (A) is at least one selected from the group consisting of a compound represented by General Formula (I) and a compound represented by General Formula (II), the component (B1) contains a fatty acid methyl ester ethoxylate, the component (C) is at least one selected from the group consisting of phenols, alcohols, carboxylic acids, aldehydes, ethers, esters, hydrocarbons, ketones, lactones, musks, natural fragrances, and animal-derived fragrances, a mass ratio represented by component (B1)/component (B2) is 1.0 or more, and a content of the fatty acid methyl ester ethoxylate is equal to or higher than 10% by mass with respect to a total mass of the component (B).

[0104]

The detergent composition of the present invention is preferably one in which the component (A) is at least one selected from the group consisting of a compound represented by General Formula (I) and a compound represented by General Formula (II), the component (B1) is at least one selected from the group consisting of a compound

represented by General Formula (III) and a compound represented by General Formula (IV), the component (B2) is at least one selected from the group consisting of a compound represented by General Formula (VI) and a linear or branched alkylbenzene sulfonate having an alkyl group of 8 to 18 carbon atoms, the component (C) is at least one selected from the group consisting of phenols, alcohols, carboxylic acids, aldehydes, ethers, esters, hydrocarbons, ketones, lactones, musks, natural fragrances, and animal-derived fragrances, and a mass ratio represented by component (B1)/component (B2) is 1.0 or more.

[0105]

10 The detergent composition of the present invention is preferably one in which the component (A) is a compound represented by General Formula (I-a), the component (B1) is at least one selected from the group consisting of a compound represented by General Formula (III) and a compound represented by General Formula (IV), the component (B2) is at least one selected from the group consisting of a compound represented by General Formula (VI) and a linear or branched alkylbenzene sulfonate having an alkyl group of 8 to 18 carbon atoms, the component (C) is at least one selected from the group consisting of phenols, alcohols, carboxylic acids, aldehydes, ethers, esters, hydrocarbons, ketones, lactones, musks, natural fragrances, and animal-derived fragrances, and a mass ratio represented by component (B1)/component (B2) is 1.0 or more.

[0106]

25 The detergent composition of the present invention is preferably one in which the component (A) is at least one selected from the group consisting of a compound represented by General Formula (I-a), the component (B1) is a compound represented by General Formula (III) and a compound represented by General Formula (IV), the

component (B2) is at least one selected from the group consisting of a compound represented by General Formula (VI) and a linear or branched alkylbenzene sulfonate having an alkyl group of 8 to 18 carbon atoms, the component (C) is at least one selected from the group consisting of phenols, alcohols, carboxylic acids, aldehydes, ethers, esters, hydrocarbons, ketones, lactones, musks, natural fragrances, and animal-derived fragrances, a mass ratio represented by component (B1)/component (B2) is 1.0 to 30, and a mass ratio represented by component (A)/component (B2) is 0.01 to 5.

[0107]

<<Method of producing detergent composition>>

10 In a case where the detergent composition of the present invention is a liquid, it is produced by mixing the components (A) to (C) and, if necessary, an optional component using a method known in the related art.

In a case where the detergent composition of the present invention is granular, it can be produced by a method known in the related art, and examples of the method include a dry blending method in which the respective raw materials are mixed in powders, a dry granulation method in which powder materials are mixed and flowed while granulating, a stirring granulation method in which powder materials are mixed and flowed while granulated by spraying a liquid binder, an extrusion granulation method in which raw materials are kneaded and extruded by an extruder, a pulverization granulation method in which raw materials are kneaded and pulverized, and a spray drying method in which a slurry containing raw materials is spray-dried.

[0108]

<<Method of using detergent composition>>

As a method of using the detergent composition of the present invention, a usual method of use is mentioned.

In a case where the detergent composition of the present invention is used for washing fiber products, for example, a method of washing an object to be washed in a washing machine using a washing liquid obtained by adding 5 to 30 mL of the detergent composition with respect to 30 L of water, and a method in which the object to be washed is immersed in the washing liquid are mentioned. In addition, a method (application washing) in which the detergent composition is directly applied to an object, the object to be washed is allowed to stand for a certain period of time, and then an ordinary washing is carried out may be used.

In a case of using the detergent composition of the present invention for washing a hard surface, a washing method in which the detergent composition is dissolved in water to prepare a washing liquid, the washing liquid is applied to the hard surface, which is an object to be washed, by spraying or the like, and then the hard surface is scrubbed with a washing tool such as a sponge is mentioned.

In a case where the detergent composition of the present invention is used for washing dishes or the like, a method of washing dishes or the like by using a sponge which is caused to contain the detergent composition, and a method of dissolving the detergent composition in water to prepare a dilute washing liquid, and scrubbing dishes with a sponge while immersing the dishes in the washing liquid.

Examples

[0109]

Hereinafter, the present invention will be described in more detail by way of examples, but the present invention is not limited to these examples.

Compositions (content (% by mass)) of the detergent compositions of the respective examples are shown in Tables 6 to 7.

In the tables, in a case where a blending component is indicated as blank, the

blending component is not blended.

In the tables, "balance" means a remainder to be added so that a total blending amount of all blending components contained in the detergent composition is 100% by mass.

5 Raw materials used in the present examples are as follows.

[0110]

<Component (A)>

· A-1: Ethylene oxide adduct of polyethyleneimine, a trade name "Sokalan HP20", manufactured by BASF. A compound of Formula (I-a) in which R²² is an
10 ethylene group and m is 20.

· A-2: Polyethyleneimine, a trade name "Lupasol P", manufactured by BASF, weight average molecular weight of about 75,000, comparative product of component (A).

[0111]

15 <Component (B)>

[Component (B1)]

· B1-1: Fatty acid methyl ester ethoxylate (MEE) (number of carbon atoms of fatty acid: 12 to 14, average addition molar number of EO: 15), General Formula (III) in which R² = alkyl group having 11 carbon atoms and alkyl group having 13 carbon atoms,
20 R³ = methyl group, s = 15, t = 0, u = 0. B1-1 was synthesized according to the synthesis method as described below.

(Synthesis of B1-1)

Synthesis was carried out according to the synthesis method described in Japanese Unexamined Patent Application, First Publication No. 2000-144179.

25 Alumina · magnesium hydroxide (Kyowado 300 (trade name), manufactured by

Kyowa Chemical Industry Co., Ltd.) having a composition of $2.5\text{MgO}\cdot\text{Al}_2\text{O}_3\cdot z\text{H}_2\text{O}$ was calcined at 600°C for 1 hour under a nitrogen atmosphere to obtain a calcined alumina-magnesium hydroxide (unmodified) catalyst. 2.2 g of the calcined alumina-magnesium hydroxide (unmodified) catalyst, 2.9 mL of 0.5 N potassium hydroxide ethanol solution, 280 g of methyl laurate, and 70 g of myristic acid methyl ester were charged in a 4 L autoclave, and a catalyst modification was carried out in the autoclave. Subsequently, after replacing an inside of the autoclave with nitrogen, 1,052 g of ethylene oxide was introduced while maintaining a temperature of 180°C and a pressure of 0.3 MPa, and reacted with stirring.

The obtained reaction solution was cooled to 80°C , 159 g of water, and 5 g each of activated clay and diatomaceous earth as a filter aid were added and mixed, and the catalyst was filtered off to obtain B1-1. A narrow rate of B1-1 was 30% by mass.

B1-1': Fatty acid methyl ester ethoxylate (MEE) (number of carbon atoms of fatty acid: 12 to 14, average addition molar number of EO: 15), General Formula (III) in which R^2 = alkyl group having 11 carbon atoms and alkyl group having 13 carbon atoms, R^3 = methyl group, $s = 15$, $t = 0$, $u = 0$. B1-1' was synthesized according to the synthesis method as described below.

(Synthesis of B1-1')

Synthesis of B1-1' was carried out according to the following synthesis method.

137 g of 2-ethylhexanol (first grade reagent, manufactured by Kanto Chemical Co., Inc.) and 41.7 g of calcium acetate monohydrate (special grade reagent, manufactured by Kanto Chemical Co., Inc.) were input in a 500 mL beaker, and mixed with a paddle stirring blade at room temperature (25°C) to obtain a dispersion (dispersing step). While stirring the dispersion, 20.9 g of sulfuric acid (special grade reagent,

manufactured by Kanto Chemical Co., Inc.) was added by a dropping funnel over 10 minutes and mixed (mixing step). In the mixing step, since heat is generated by the addition of sulfuric acid, the beaker was cooled in a water bath, and a reaction temperature was controlled to 30°C to 50°C. After adding sulfuric acid, the mixture

5 was further stirred for 2 hours while maintaining at 50°C (catalyst aging step) to obtain an alkoxylation catalyst.

In the autoclave, 12.5 g of the above alkoxylation catalyst, 462 g of methyl laurate (pastel M12, manufactured by Lion Chemical Co., Ltd.) and 166 g of methyl myristate (Paster M14, manufactured by Lion Chemical Co., Ltd.) were input and stirred.

10 While stirring, an inside of the autoclave was replaced with nitrogen, a temperature was raised to 100°C, and dehydration was carried out for 30 minutes under a reduced pressure condition of 1.3 kPa or less. Subsequently, a temperature was raised to 160°C, and 1,876 g (15 times a total molar amount of methyl laurate and methyl myristate) of ethylene oxide (EO) was introduced and stirred under a condition of 0.1 to 0.5 MPa

15 (addition reaction step). Furthermore, after stirring at an addition reaction temperature for 0.5 hours (aging step), the mixture was cooled to 80°C to obtain 2516 g of a crude reaction product (fatty acid methyl ester ethoxylate (MEE), average EO addition molar number = 15). One obtained by filtering the crude reaction product to remove the catalyst was designated as B1-1'.

20 · B1-2: Alcohol ethoxylate (AE), obtained by adding 15 mol of ethylene oxide to a natural alcohol. General Formula (IV) in which R^4 = an alkyl group having 12 carbon atoms and an alkyl group having 14 carbon atoms, $v = 15$, $w = 0$, $x = 0$. B1-2 was synthesized according to the synthesis method as described below.

(Synthesis of B1-2)

224.4 g of CO-1214 (trade name), manufactured by Procter & Gamble Co., Ltd., and 2.0 g of a 30% by mass NaOH aqueous solution were charged in a pressure-resistant reaction vessel, and an inside of the reaction vessel was replaced with nitrogen. Next, after carrying out dehydration at a temperature of 100°C and a pressure of 2.0 kPa or less for 30 minutes, a temperature was raised to 160°C. Subsequently, 760.6 g of ethylene oxide (gaseous form) was slowly added to the reaction solution while stirring the reaction solution. At this time, ethylene oxide was added via a blowing tube while modulating an addition rate so that a reaction temperature does not exceed 180°C.

After completing the addition of ethylene oxide, aging was carried out at a temperature of 180°C and a pressure of 0.3 MPa or less for 30 minutes, and then unreacted ethylene oxide was distilled off at a temperature of 180°C and a pressure of 6.0 kPa or less for 10 minutes.

Next, after cooling a temperature to 100°C or lower, neutralization was carried out by adding a 70% by mass p-toluenesulfonic acid so that a pH of a 1% by mass aqueous solution of the reactant is about 7, and B1-2 was obtained.

· B1-3: Alcohol ethoxylate (AE), obtained by adding 7 mol equivalent of ethylene oxide to a natural alcohol. General Formula (IV) in which R^4 = an alkyl group having 12 carbon atoms and an alkyl group having 14 carbon atoms, $v = 7$, $w = 0$, $x = 0$. B1-3 was synthesized according to the synthesis method as described below.

(Synthesis of B1-3)

224.4 g of CO-1214 (trade name), manufactured by Procter & Gamble Co., Ltd., and 2.0 g of a 30% by mass NaOH aqueous solution were charged in a pressure-resistant reaction vessel, and an inside of the reaction vessel was replaced with nitrogen. Next, after carrying out dehydration at a temperature of 100°C and a pressure of 2.0 kPa or less

for 30 minutes, a temperature was raised to 160°C. Subsequently, 355.0 g of ethylene oxide (gaseous form) was slowly added to the reaction solution while stirring the reaction solution. At this time, ethylene oxide was added via a blowing tube while adjusting an addition rate so that a reaction temperature does not exceed 180°C.

5 After completing the addition of ethylene oxide, aging was carried out at a temperature of 180°C and a pressure of 0.3 MPa or less for 30 minutes, and unreacted ethylene oxide was distilled off at a temperature of 180°C and a pressure of 6.0 kPa or less for 10 minutes.

Next, after cooling a temperature to 100°C or lower, neutralization was carried
10 out by adding a 70% by mass p-toluenesulfonic acid so that a pH of a 1% by mass aqueous solution of the reactant is about 7, and B1-3 was obtained.

· B1-4: One obtained by performing block addition of 8 mol equivalent of ethylene oxide, 2 mol equivalent of propylene oxide, and 8 mol equivalent of ethylene oxide, in this order, to a natural alcohol (alcohol having 12 carbon atoms/alcohol having
15 14 carbon atoms = 7/3 in mass ratio). General Formula (IV) in which R^4 = an alkyl group having 12 carbon atoms and an alkyl group having 14 carbon atoms, $v = 8$, $w = 2$, $x = 8$.

· B1-5: One obtained by adding 7 mol of ethylene oxide to a secondary alcohol having 12 carbon atoms and a secondary alcohol having 14 carbon atoms. A trade name
20 "SOFTANOL 70", manufactured by Nippon Shokubai Co., Ltd. General Formula (IV) in which R^4 = a secondary alkyl group having 12 carbon atoms and a secondary alkyl group having 14 carbon atoms, $v = 7$, $w = 0$, $x = 0$.

[0112]

[Component (B2)]

· B2-1: Sodium polyoxyethylene alkyl ether sulfate (AES). A compound of Formula (VI) in which R^{40} = a linear alkyl group having 12 to 14 carbon atoms, $m = 1.0$, $n = 0$, M = sodium. B2-1 was synthesized according to the synthesis method as described below.

5 (Synthesis of B2-1)

400 g of a trade name CO1270 alcohol (a mixture of an alcohol having 12 carbon atoms and an alcohol having 14 carbon atoms at a mass ratio of 75/25), manufactured by P & G Co., as a raw material alcohol and 0.8 g of potassium hydroxide as a reaction catalyst were charged in a 4 L-volume autoclave, and an inside of the
10 autoclave was replaced with nitrogen. Then, a temperature was raised while stirring. Subsequently, 91 g of ethylene oxide was introduced while maintaining a temperature of 180°C and a pressure of 0.3 MPa or less, and reacted to obtain an alcohol ethoxylate.

Gas chromatograph mass spectrometer: GC-5890, manufactured by Hewlett-Packard Company, detector: hydrogen flame ionization type detector (FID),
15 column: Ultra-1 (manufactured by HP Corporation, L 25 m x ϕ 0.2 mm x T 0.11 μ m) were used for analysis. As a result, the obtained alcohol ethoxylate had an average ethylene oxide addition molar number of 1.0. In addition, a compound to which ethylene oxide was not added was 43% by mass with respect to a total mass of the obtained alcohol ethoxylate.

20 Next, 237 g of the alcohol ethoxylate obtained in the above was taken in a 500 mL flask equipped with a stirrer, and replacement with nitrogen was performed. Then, 96 g of liquid sulfuric anhydride (sulfan) was slowly added dropwise while maintaining a reaction temperature at 40°C. After completion of the dropwise addition, stirring was continued for 1 hour (sulfation reaction) to obtain polyoxyethylene alkyl ether sulfuric

acid. Subsequently, this was neutralized with an aqueous solution of sodium hydroxide to obtain B2-1.

· B2-2: Linear sodium alkylbenzene sulfonate (LAS), trade name "LIPON LH-200", manufactured by Lion Corporation.

5 · B2-3: Monoethanolamine salt of polyoxyalkylene alkyl ether sulfuric acid ester (AEPS). A compound of Formula (VI) in which R^{40} = a linear alkyl group having 12 carbon atoms, $m = 2.0$, $n = 1.0$, M = monoethanolamine. B2-3 was synthesized according to the synthesis method as described below.

(Synthesis of B2-3)

10 640 g of a linear primary alcohol having 12 carbon atoms [trade name: 1-DODECANOL (molecular weight of 186.33), purity > 99%, manufactured by Tokyo Chemical Industry Co., Ltd.] and 1.0 g of KOH were charged in an autoclave equipped with a stirrer, a temperature control device, and an automatic introduction device, and dehydration was carried out at 110°C and 1.3 kPa for 30 minutes. After dehydration,
15 nitrogen replacement was carried out, and a temperature was raised to 120°C. Then, 199 g of propane-1,2-diyl oxide was charged. Subsequently, addition reaction and aging were carried out at 120°C, then the temperature was raised to 145°C, and 303 g of ethylene oxide was charged. Subsequently, after addition reaction and aging were carried out at 145°C, cooling to 80°C was performed, and unreacted ethylene oxide was
20 removed at 4.0 kPa. After removal of the unreacted ethylene oxide, 1.0 g of acetic acid was added to the autoclave, stirred at 80°C for 30 minutes, and then extraction was carried out to obtain an alkoxylate in which the alkyl group is a dodecyl group, an average addition molar number of PO is 1.0, and an average addition molar number of EO is 2.0.

The obtained alkoxylate was sulfated with a descending thin film reactor using SO_3 gas. The obtained sulfate was neutralized with monoethanolamine to obtain a composition containing monoethanolamine salt (AEPS) of polyoxyethylene polyoxypropane-1,2-diyl alkyl ether sulfate ester.

- 5 · B2-4: Coconut fatty acid, trade name "COCONUT FATTY ACID",
manufactured by NOF CORPORATION.

[0113]

<Component (C)>

- C-1: Fragrance shown in Tables 1 to 5.

[0114]

[Table 1]

	Fragrance (% by mass)
Petit Grain oil	0.5
Orange oil	3
Clove oil	0.002
Citronella oil	0.2
Pine oil	0.02
Bergamot oil	1
Mandarin oil	0.5
Lime oil	1
Lemon oil	1.3
Lemon grass oil	1
Galbanum resinoid	0.1
α -Pinene	0.001
β -Pinene	0.003
Limonene	1
3-Carene	0.002
β -Caryophyllene	0.03
Myrcene	0.05
p-Cymene	0.001
Orange terpene	5
trans-2-hexenol	0.005
trans-3-hexenol	0.005
Orange flower absolute	0.001
Chamomile oil	0.001
Violet absolute	0.001
Basil oil	0.001
Myrcenol	2
Dihydromyrcenol	2
Tetrahydromyrcenol	0.1
Terpineol	3
Farnesol	0.1
Nerolidol	2
1-Octanol	1
1-Nonanol	1
Leaf alcohol	1
Matsutakeol	0.01
Citral	1
n-Octanal	0.3
n-Nonanal	0.3
1-Decanal	0.5
Undecanal	0.001
Dodecanal	0.001
cis-3-hexenal	0.2
Triplal	0.001
Benzaldehyde	0.001
Nootkatone	0.001
α -Dynascone	0.001
cis-3-hexenyl acetate	0.1
Allyl amyl glycolate	0.01
Ethyl acetate	0.02
Linalyl acetate	2
Neryl acetate	0.002
Terpinyl acetate	0.05
Isobornyl acetate	

[0115]

[Table 2]

	Fragrance (% by mass)
Verdox	0.001
Flutate	0.05
Manzanate	1
Ethyl salicylate	0.1
Benzyl salicylate	2
Ethyl-2,2,6-trimethylcyclohexane carbonate	2
γ -Nonalactone	0.001
γ -Decalactone	0.001
γ -Undecalactone	1
Methyl anthranilate	1
cis-3-hexenyl anthranilate	0.001
Phenylethyl anthranilate	0.001
Cinnamyl anthranilate	0.001
Methyl N-methyl anthranilate	0.5
Aurantiol	0.1
Citronellyl nitrile	1
Lemonyl	1.5
Fennel oil	0.001
Clary sage oil	0.5
Mint oil	0.005
Eucalyptus oil	0.1
Lavender oil	0.1
Lavandin absolute	0.1
Rosemary oil	0.03
Peppermint terpene	0.02
Menthol	0.5
Carvone	
Menthone	
Camphor	
1,8-Cineole	1
Chavicol	0.1
Carvacrol	0.1
0.1% Ethanol solution of benzothiazole	0.001
0.1% Ethanol solution of mintsulfide	0.001
Caraway seed oil	0.5
Cumin alcohol	1
Coriander oil	0.5
Nutmeg oil	0.5
Anis alcohol	1
Anis aldehyde	1
Acetyl eugenol	0.3
Acetyl isoeugenol	0.3
Anethole	0.3
Methyl eugenol	0.3
Thymol	0.3
Eugenol	0.3
Isoeugenol	0.3
Methyl isoeugenol	0.1
Ethyl isoeugenol	0.1
Benzyl eugenol	0.1
Benzyl isoeugenol	0.3
Mimosa concrete	
Jasmine concrete	0.1
Geranium oil	0.2
Ylang ylang oil	0.01
Bois de rose oil	0.02

[0116]

[Table 3]

	Fragrance (% by mass)
Rose concrete	0.2
Rose wax	0.007
Jasmine wax	0.001
Geraniol	3
Citronellol	5
Nerol	1
Linalool	3
Tetrahydrolinalool	1
Benzyl alcohol	1
β -Phenylethyl alcohol	1
Styrallyl alcohol	1
Cinnamic alcohol	0.5
Phenoxyethyl alcohol	0.5
Citronellal	0.005
Hydroxycitronellal	
Muget aldehyde	0.001
Dupical	0.1
Bourgeonal	0.1
Cyclamenaldehyde	0.05
Floralozone	
Cinnamic aldehyde	
Helional	0.05
Lylal	1
Lilial	1
α -Amyl cinnamic aldehyde	0.2
α -Hexyl cinnamic aldehyde	1
cis-jasmone	0.001
Isojasmone	
4-Damascol	0.07
Damascenone	0.2
Damascone	0.3
Calone	0.001
Citronellyl formate	0.001
Geranyl formate	
Neryl formate	
Citronellyl acetate	0.1
Geranyl acetate	0.2
Tricyclodecenyl acetate	0.3
Benzyl acetate	0.2
Phenylethyl acetate	0.1
Styrallyl acetate	
Rose phenone	0.02
Cinnamyl acetate	0.1
Dimethyl benzyl carbinyl acetate	0.05
Jasmal	
Tricyclodecenyl propionate	0.1
Benzyl propionate	0.001
Methyl jasmonate	0.001
Hedione	2
Aldehyde C-16	
Methyl cinnamate	
Ethyl cinnamate	0.002
Linalool oxide	0.1
Herboxide	
Rose oxide	0.001

[0117]

[Table 4]

	Fragrance (% by mass)
β -Naphthol methyl ether	0.003
β -Naphthol ethyl ether	0.001
Guaiacol	0.1
Anthranilic acid	0.1
Benzoic acid	0.1
Phenyl acetate	0.001
Ligantraal	0.001
Indole	0.01
1% Dipropylene glycol solution of 6-isopropyl quinoline	0.01
1% Ethanol solution of isobutyl quinoline	0.01
1% Benzyl benzoate solution of 2-isobutyl quinoline	0.001
Ambrette seed oil	
Iris resinoid	
Elemio oleoresin	
Elemi absolute	2
Oak moss absolute	0.005
Olibanum resinoid	0.001
Guaiac wood oil	0.5
Copaiba balsam	
Styrax oil	0.03
Tolu balsam	0.3
Patchouli oil	0.006
Vanilla absolute	0.001
Vetiver oil	0.1
Benzoin resinoid	
Labdanum oil	
Cedrene	0.1
Cedrol	0.001
Santalinol	0.005
Bacdanol	0.5
Sanderol	0.001
Amburinol	0.1
Timberol	0.02
Borneol	0.01
Isoborneol	0.05
Polysantol	0.05
Vanillin	0.05
Ethyl vanillin	0.05
Heliotropin	0.5
Maltol	0.05
Ethyl maltol	0.05
Raspberry ketone	0.3
Ionone	0.5
Methylionone	1
Vertofix	1
Cashmeran	0.1
Musccone	0.5
Traseolide	0.1
Tonalid	1
Iso E Super	1
Vetiverol	0.1
Patchouli alcohol	0.1
Habanolide	0.5
Ambrettolide	0.001
Cyclohexadecanolide	0.001
Opopanax resinoid	0.1

[0118]

[Table 5]

	Fragrance (% by mass)
Castoreum absolute	
Sandalwood oil	0.2
Cedryl acetate	0.1
Ambroxan	0.5
50% Dipropylene glycol DPG-FC solution of galaxolide	1
Vanillin propylene glycol acetal	0.3
Pentalide	1
Ambrettolide	0.001
Ethylene brassylate	1
Coumarin	0.002
Musk ketone	0.3
Musk ambrette	0.3
Musk tibetene	0.03
Ethanol	0.5
Propylene glycol (Asahi Glass Co., Ltd.)	0.3
Diethyl phthalate (Kyowa Hakko Kogyo Co., Ltd.)	0.02
Carbitol (Sigma-Aldrich Corporation)	1
Isopropyl myristate (Lion Oleochemicals Co.)	0.5
Dipropylene glycol DPG-FC (Asahi Glass Co., Ltd.)	3
1,3-Butylene glycol (Daicel Chemical Industries, Ltd.)	1
Benzyl benzoate	1
Hercolyne (Hercules, Inc.)	0.5
Dibutyl hydroxytoluene	0.001
Total	100
Proportion (% by mass) of OH/COOH-containing compounds	44

[0119]

<Component (D)>

5 D-1: Polymer having a specific repeating unit (d1) and an oxyalkylene unit (d2).

Trade name "TexCare SRN-170", manufactured by Clariant, weight average molecular weight of 2,000 to 3,000, with a polymer compound represented by General Formula (D1) being included. D-1 satisfies a condition of the above-mentioned "water-soluble polymer" (that is, after 10 g of a polymer is added to 1,000 g of water at a condition of 10 40°C in a 1 liter beaker and stirred (200 rpm) for 12 hours with a stirrer (8 mm in thickness, 50 mm in length), the polymer is dissolved).

<Component (E)>

· Sodium lactate (stabilizer), trade name "sodium lactate", manufactured by Kanto Chemical Co., Ltd.

15

<Component (F)>

· Alcalase (protease), trade name "Alcalase 2.5 L", manufactured by Novozymes.

[0120]

<Optional components>

5 · MEA: Monoethanolamine (alkaline agent), trade name "monoethanolamine", manufactured by Nippon Shokubai Co., Ltd.

· BHT: Dibutylhydroxytoluene (antioxidant), trade name "SUMILZER BHT-R", manufactured by Sumitomo Chemical Co., Ltd.

10 · Ethanol (water-miscible organic solvent), trade name "Special Alcohol 95% Synthetic", manufactured by Japan Alcohol Trading Co., Ltd.

· Sodium benzoate (preservative), trade name "SODIUM BENZOATE", manufactured by Toagosei Co., Ltd.

· Calcium chloride (enzyme stabilizer), trade name "CALCIUM CHLORIDE (special grade)", manufactured by Kanto Chemical Co., Ltd.

15 · Pigment (coloring agent), trade name "Green No. 3", manufactured by Sumi Chemical Industry Co., Ltd.

[0121]

<Method for producing detergent composition>

(Examples 1 to 13, Comparative Examples 1 to 5)

20 In accordance with compositions shown in Tables 6 to 7, the respective components were added to water and mixed to obtain detergent compositions of Examples 1 to 13 and Comparative Examples 1 to 5.

With respect to the detergent compositions of Examples 1 to 13 and Comparative Examples 1 to 5, a recontamination-preventing performance, a

scent-lingering property, and a storage stability were evaluated as follows.

[0122]

<Evaluation of recontamination-preventing performance>

Using the detergent composition of each example, a cleaning treatment was
5 conducted by repeating a washing step, a rinsing step, and a drying step, which are as
shown below, three times in this order.

[0123]

Washing step:

The following cotton cloth, artificially contaminated wet type cloth, and
10 undershirt were used as objects to be washed.

- Cotton cloth: Five pieces of 5 cm x 5 cm of cotton knitted fabric (manufactured by Tanigori Shoten Co., Ltd.) as cloths for determining recontamination.

- Artificially contaminated wet type cloth: 20 pieces of contaminated cloth (cloth with stains having a composition of 28.3% by mass of oleic acid, 15.6% by mass of triolein, 12.2% by mass of cholesterol oleate, 2.5% by mass of liquid paraffin, 2.5% by
15 mass of squalene, 1.6% by mass of cholesterol, 7.0% by mass of gelatin, 29.8% by mass of mud, and 0.5% by mass of carbon black), manufactured by the Laundry Research Association.

- Undershirt: 150 pieces of undershirt (LL size, made by DVD Company) which
20 are cut minutely (about 3 cm x 3 cm).

900 mL of 3° DH hard water at 25°C was input in a Terg-o-tometer (manufactured by UNITED STATES TESTING), and 0.6 g of the detergent composition was added thereto. Subsequently, the above-mentioned objects to be washed were added to adjust a bath ratio to 20 times, and washed at 120 rpm and 25°C for 10 minutes.

[0124]

Rinsing step:

The washed objects were dehydrated for 1 minute. Then, 900 mL of 3° DH hard water at 25°C was input and rinsed at 120 rpm and 25°C for 3 minutes. This operation (dehydration, rinsing) was repeated twice. In a second round, a predetermined amount of a softening agent was added to 900 mL of 3° DH hard water at 25°C, and rinsing was carried out. For the softening agent, Heyaboshi (Hang-to-Dry Indoors) Soflan (manufactured by Lion Corporation) was used.

[0125]

10 Drying step:

The rinsed objects were dehydrated for 1 minute. Then, only the cloth for determining recontamination (cotton cloth) was taken out, sandwiched between filter papers, and dried with an iron.

[0126]

15 Using a reflectometer (spectroscopic color difference meter SE2000, manufactured by Nippon Denshoku Industries Co., Ltd.), reflectances (Z values) of the cloth for determining recontamination before and after a cleaning treatment were measured and ΔZ was calculated from the following expression.

$$\Delta Z = (\text{Z value before cleaning treatment}) - (\text{Z value after cleaning treatment})$$

20 With respect to ΔZ in the cloth for determining recontamination which is a cotton cloth, an average value of 5 pieces was calculated. Then, according to the following determination criteria using this average value as an index, an effect of preventing recontamination of the cotton cloth due to the detergent composition was evaluated. In the following evaluation criteria, C and D were considered as acceptable.

Evaluation results are shown in Tables 6 to 7.

[0127]

[Evaluation criteria]

C: ΔZ is lower than 5.

5 D: ΔZ is equal to or higher than 5 and lower than 7.

E: ΔZ is equal to or higher than 7 and lower than 9.

F: ΔZ is 9 or more.

[0128]

<Evaluation of scent-lingering property>

10 (1) Treatment of cotton towel using detergent composition

(Pretreatment of cloth to be evaluated)

For a commercially available cotton towel (manufactured by Todokei Co., Ltd.), the following pretreatment was carried out three times with a commercially available detergent "Top Platinum Clear" (manufactured by Lion Corporation) using a two-vessel washing machine (VH-30S, manufactured by Toshiba Corporation).

Pretreatment: 2 cycles of washing with tap water at 45°C for 10 minutes and subsequent water-injection rinsing for 10 minutes, with a standard amount used of detergent and a bath ratio of 30 times.

(Treatment with detergent composition in rinsing step during cleaning)

20 1.0 kg of the cotton towel (manufactured by Todokei Co., Ltd.) that had been washed by the pretreatment was washed with each of the detergent compositions described in Tables 6 to 7 for 10 minutes (with standard amount used, standard course, bath ratio of 30 times, and tap water at 25°C being used) using a two-vessel washing machine (VH-30S, manufactured by Toshiba Corporation). Then, dehydration was

carried out for 1 minute, and subsequently, a first rinsing was carried out for 3 minutes.

After the first rinsing, dehydration was carried out for 1 minute. Subsequently, a second rinsing was carried out for 3 minutes, and then dehydration was carried out for 1 minute.

(2) Evaluation of treated cloth

5 A scent intensity of the treated cloth (cotton towel) that had been dried for 18 hours and stored for 5 days under a condition of 20°C and 40 RH was sensory-evaluated in accordance with the following 6-step smell intensity indication method. Using an average point of eight expert panelists (calculated up to a first decimal place), a scent sustainability was evaluated according to the following determination criteria. In terms
10 of a product value, D or higher was considered as acceptable. The evaluation results are shown in Tables 6 to 7.

<6-step smell intensity indication method>

0: Smell-less

1: Scent at a degree which is barely detectable

15 2: Scent at a degree which is enough to know what the scent is

3: Scent which is easily recognizable

4: Strong scent

5: Intense scent

[Evaluation criteria]

20 A: 3.0 points or higher

B: 2.9 to 2.5 points

C: 2.4 - 2.0 points

D: 1.9 to 1.5 points

E: 1.4 to 1.0 points

25 F: 0.9 or lower

[0129]

<Evaluation of storage stability>

A transparent glass bottle (wide mouth standard bottle, PS-No. 11) was filled with 100 mL of the detergent composition of each example, a lid thereof was closed and sealed. In this state, the bottle was stored by being allowed to stand in a thermostat at 5°C or 25°C for 7 days.

After such a storage, an appearance of the liquid was visually observed and storage stability of the detergent composition was evaluated according to the following evaluation criteria. E or higher was considered as acceptable. The evaluation results are shown in Tables 6 to 7.

[Evaluation criteria]

D: No precipitates are observed at a bottom of the glass bottle, and the liquid is flowable.

E: Precipitates are observed at a bottom of the glass bottle, but in a case where the glass bottle is gently shaken, the precipitates disappear (are dissolved).

F: Precipitates are observed at a bottom of the glass bottle. Even in a case where the glass bottle is gently shaken, the precipitates do not disappear, or gelation or opaqueness occurs immediately after preparation of a detergent composition.

[0130]

<Evaluation of SR effect>

A test cotton cloth (cotton/polyester = 40/60) to be evaluated and a cotton knitted fabric were introduced into a fully automatic electric washing machine (AW-80VC, manufactured by Toshiba Corporation) to make a bath ratio of 20 times. Thereinto, 12 g of the liquid detergent of Example 1 or Example 12 was added, and a cleaning operation was done by sequentially carrying out washing, rinsing, and

dehydration with a standard course. Regarding a washing time, a rinsing, a dehydration, and a water volume (set to 36 L), a standard setting of the washing machine was used without any adjustment. A temperature of the tap water used was 15°C. This cleaning operation was repeated 5 times. After finishing the 5 cleaning operations, the test
5 cotton cloth to be evaluated was flattened and dried overnight, and the dried test cotton cloth to be evaluated was cut into a 5 x 5 cm one, which was used as a cloth to be evaluated. To this cloth to be evaluated, 50 µL of a stain-forming fat (mixture of oleic acid, palmitic acid, myristic acid, lauric acid, triolein, tripalmitin, hexadecyl palmitate, squalene, and carbon black) was applied and dried for 24 hours to manufacture a grimy
10 cloth.

With respect to this grimy cloth, a washing test as described below was carried out.

As a washing tester, Terg-O-tometer (manufactured by UNITED STATES TESTING) was used. As a washing liquid, one prepared by adding 300 µL of the liquid
15 detergent of Comparative Example 4 to 900 mL of water and stirring the mixture for 30 seconds was used. 900 mL of the washing liquid, 5 pieces of the grimy cloth and the washed knitted fabric were placed in the washing tester to make a bath ratio of 20 times, and washing was performed at 120 rpm at 15°C for 20 minutes. Next, the objects were transferred to a two-vessel washing machine (product name CW-C30A1-H1,
20 manufactured by Mitsubishi Electric Corporation), dehydrated for 1 minute, rinsed in 30 L of tap water (15°C, 4° DH) for 3 minutes, and air-dried. With respect to each of the non-grimy cloth (cloth to be evaluated), the grimy cloth before washing, and the grimy cloth after washing, a reflectance was measured with a color difference meter (manufactured by Nippon Denshoku Co., Ltd.: product name SE200 type) for each of the
25 unclean cloth (evaluation cloth), and a washing rate (%) was calculated by the following

expression.

Washing rate (%) = (K/S of grimy cloth before washing - K/S of grimy cloth after washing)/(K/S of grimy cloth before washing - K/S of non-grimy cloth) x 100

Here, K/S is $(1 - R/100)^2 / (2R/100)$ (where R is a reflectance of the grimy cloth before washing, a reflectance of the grimy cloth after washing, or a reflectance of the non-grimy cloth (%)). An average value of the washing rate of five pieces of the grimy cloth was calculated, and, according to the following evaluation criteria in which the average value is used as an index, SR effects of the liquid detergents of Example 1 and Example 12 were evaluated. C and D were considered as acceptable.

10 [0131]

[Evaluation criteria of SR effect]

C: Washing rate is 10% or more.

D: Washing rate is equal to or higher than 7% and lower than 10%.

E: Washing rate is equal to or higher than 4% and lower than 7%.

15 F: Washing rate is lower than 4%.

[0132]

<Evaluation of enzyme stability (enzyme activity residual rate)>

The liquid detergents of Example 1, Example 13, and Comparative Example 1 were produced, and stored at 37°C and 4°C for 4 weeks, respectively. With respect to the liquid detergents (37°C-stored products) which had been stored at 37°C for 4 weeks and the liquid detergents (4°C-stored products) which had been stored at 4°C for 4 weeks, a protease activity as shown below was measured.

[0133]

Measurement of protease activity:

25 Milk casein (Casein, Bovine Milk, Carbohydrate and Fatty Acid

Free/Calbiochem (registered trademark)) was dissolved in 1N sodium hydroxide (1 mol/L sodium hydroxide solution (1N), manufactured by Kanto Kagaku Co.), a pH thereof was adjusted to 10.5, and diluted with an aqueous solution of 0.05 M boric acid (boric acid (special grade), manufactured by Kanto Chemical Co., Inc.) so that a
5 concentration of the milk casein was 0.6%, which was used as a protease substrate.

A solution in which 1 g of the obtained liquid detergent had been 25-fold diluted with calcium chloride (calcium chloride (special grade), manufactured by Kanto Chemical Co., Inc.) 3° DH hard water was used as a sample solution.

5 g of the above protease substrate was added to 1 g of the sample solution, the
10 mixture was stirred for 10 seconds with a vortex mixer, and then allowed to stand at 37°C for 30 minutes to proceed an enzymatic reaction. Thereafter, 5 g of a 0.44 M aqueous solution of trichloroacetic acid (TCA (special grade), manufactured by Kanto Chemical Co., Inc.) as an enzymatic reaction terminator was added to the above solution, and the mixture was stirred with a vortex mixer for 10 seconds. Thereafter, this solution was
15 allowed to stand at 20°C for 30 minutes, an unreacted substrate which was precipitated was removed with a 0.45 µm filter, and the filtrate was recovered.

An absorbance (absorbance A) of the recovered filtrate at a wavelength of 275 nm was measured using an ultraviolet-visible spectrophotometer UV-160, manufactured by Shimadzu Corporation. A larger absorbance A shows that a larger amount of
20 tyrosine (produced by degradation of the protease substrate due to the protease) is present in the filtrate.

In order to eliminate an influence of absorption other than that by a target component, 5 g of TCA as an enzymatic reaction terminator was separately added to 1 g of each sample solution, stirred for 10 seconds with a vortex mixer, then 5 g of the
25 protease substrate was added. The mixture was stirred with a vortex mixer for 10

seconds, removed with a 0.45 µm filter, and the filtrate was recovered. Thereafter, an absorbance (absorbance B) of the filtrate at a wavelength of 275 nm was measured using UV-160.

[0134]

5 From the measurement results of the above protease activity, a protease activity residual rate (%) was calculated by the following expression.

For the absorbance value at 275 nm of each sample to be put in the following expression, in order to exclude a scattered light such as air bubbles from the absorbance, one obtained by dividing an absorbance value at 600 nm which was measured at the same
10 time was used.

Protease activity residual rate = (absorbance A of 37°C-stored product - absorbance B of 37°C-stored product)/(absorbance A of 4°C-stored product - absorbance B of 4°C-stored product) x 100

[0135]

15 Using such a protease activity residual rate (%) as an index, an enzyme stability was evaluated based on the following criteria, and C, D, and E were considered as acceptable.

C: 80% or more.

D: Equal to or higher than 70% and lower than 80%.

20 E: Equal to or higher than 60% and lower than 70%.

F: Lower than 60%.

[0136]

[Table 6]

		Example											
		1	2	3	4	5	6	7	8	9	10	11	12
Component (A)	A-1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	5	0.2	1.2	1.2
	A-2												
Component (B)	B1-1	30		30	30	30	5	45	20	30	30		30
	B1-1'		30										
	B1-2	5	5	5	5	5	30	5	5	5	5	4	5
	B1-3											20	
	B1-4											30	
	B1-5												
	B2-1	10	10	5	15		10		11.5	10	10		10
	B2-2	5	5	10		15	5	2.5	11.5	5	5		5
	B2-3												
	B2-4	2	2	2	2	2	2	2	2	2	2	2	2
Component (C)	C-1	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Component (D)	D-1												
Component (E)	Sodium lactate	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.1
Component (F)	Alcalase	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	MEA	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Optional component	BHT	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	Ethanol	8	8	8	8	8	8	8	8	6	6	6	8
	Sodium benzoate	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Calcium chloride	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	Pigment	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
	Water	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance
	Total	100	100	100	100	100	100	100	100	100	100	100	100
	B1/B2 ratio	2.1	2.1	2.1	2.1	2.1	2.1	11.1	1.0	2.1	2.1	27.0	2.1
	A/B2 ratio	0.07	0.07	0.07	0.07	0.07	0.07	0.27	0.05	0.29	0.012	0.600	0.07
	Recontamination-preventing performance	C	C	C	C	C	C	E	C	C	D	E	C
Evaluation result	SR effect	D	-	-	-	-	-	-	-	-	-	-	-
	Enzyme stability	C	-	-	-	-	-	-	-	-	-	-	-
	Scent-lingering property	B	B	B	B	B	C	A	D	A	D	A	B
	Storage stability	D	D	D	D	D	E	D	D	E	D	D	D

[0137]

[Table 7]

			Comparative Example				
			1	2	3	4	5
Component (A)		A-1		1.2			1.2
		A-2				1.2	
Component (B)	Component (B1)	B1-1	30	10	10	30	
		B1-2	5	5	5	5	8
		B1-3					
		B1-4					7
		B1-5					12
	Component (B2)	B2-1	5	17.5	17.5	10	
		B2-2	10	17.5	17.5	5	
		B2-3					30
B2-4		2	2	2	2	4	
Component (C)		C-1	0.4	0.4	0.4	0.4	0.4
Component (D)		D-1					
Component (E)		Sodium lactate	0.5	0.5	0.5	0.5	0.5
Component (F)		Alcalase	0.3	0.3	0.3	0.3	0.3
Optional component		MEA	0.5	0.5	0.5	0.5	0.5
		BHT	0.05	0.05	0.05	0.05	0.05
		Ethanol	6	6	6	6	6
		Sodium benzoate	0.5	0.5	0.5	0.5	0.5
		Calcium chloride	0.01	0.01	0.01	0.01	0.01
		Pigment	0.0005	0.0005	0.0005	0.0005	0.0005
		Water	Balance	Balance	Balance	Balance	Balance
Total			100	100	100	100	100
B1/B2 ratio			2.1	0.4	0.4	2.1	0.8
A/B2 ratio			0.000	0.03	0.00	0.1	0.04
Evaluation result	Recontamination-preventing performance		E	C	C	F	C
	SR effect		-	-	-	-	-
	Scent-lingering property		E	E	F	F	F
	Enzyme stability		F	-	-	-	-
	Storage stability		D	D	D	D	D

[0138]

From the results of Tables 6 to 7, Examples 1 to 13 to which the present invention is applied were excellent in recontamination-preventing performance and excellent in scent-lingering property.

Comparative Example 1 which does not contain the component (A) was inferior in scent-lingering property.

Comparative examples 2 and 5 in which a B1/B2 ratio is outside a range of numerical values of the present invention were inferior in scent-lingering property.

Comparative Example 3 which does not contain the component (A) and in

which a B1/B2 ratio is outside a range of numerical values of the present invention was inferior in scent-lingering property.

Comparative Example 4 in which polyethyleneimine is used instead of the component (A) was inferior in recontamination-preventing performance and
5 scent-lingering property.

Industrial Applicability

[0139]

According to the present invention, it is possible to provide a detergent
10 composition having a high scent-lingering property.

CLAIMS

1. A detergent composition comprising:

an alkylene oxide adduct (A) of a polyalkyleneamine;

5 a surfactant (B) containing a nonionic surfactant (B1) and an anionic surfactant (B2); and

a fragrance (C),

wherein a mass ratio represented by component (B1)/component (B2) is 1.0 or more.

10

2. The detergent composition according to claim 1,

wherein the component (B1) contains a fatty acid methyl ester ethoxylate, and

a content of the fatty acid methyl ester ethoxylate is equal to or higher than 10% by mass with respect to a total mass of the component (B).

15

3. The detergent composition according to claim 1 or 2, further comprising:

a component (D) which is a polymer having at least one repeating unit (d1)

selected from the group consisting of an alkylene terephthalate unit and an alkylene isophthalate unit, and an oxyalkylene unit (d2).

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4. The detergent composition according to any one of claims 1 to 3, further comprising:

a component (E) which is at least one selected from carboxylic acids represented by General Formula (VII) and salts thereof; and

25 a component (F) which is an enzyme,



in Formula (VII), R^1 is a divalent hydrocarbon group having 1 to 4 carbon atoms or an arylene group, and X is -H, -OH, -CH₃, or -COOH.